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PREFACE.

IN working the Exercises in the latter half of this book, I have had abundant evidence of the superior advantages of the *Unitary Method* as compared with the processes of statement by the *Rule of Three*, Simple and Compound. I have not found a single Example in which the steps necessary for a solution by the French system presented the slightest difficulty. That the Unitary Method is gaining ground rapidly in this country I cannot doubt, and I believe that the sanction of H. M. Inspectors of Schools is all that is now required to make the adoption of the System general throughout England.

J. HAMBLIN SMITH.

CAMBRIDGE, *January* 1876.

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KEY TO ARITHMETIC.

Ex. (1), p. 5.

(1) Seven; thirteen; forty-five; fifty-nine; three hundred and twenty-six; four thousand, five hundred and seventy-eight.

(2) Ninety; one hundred and ten; two hundred and seven; four thousand, three hundred; four thousand and thirty-six; four thousand, three hundred and six.

(3) Seven hundred and eighty; six hundred and nine; five thousand, three hundred and sixty; two thousand and twenty; one thousand, one hundred and one.

(4) Thirty-six thousand, four hundred and ninety-seven; forty-nine thousand, five hundred and thirty-two; six hundred and fifty-four thousand, three hundred and twenty-one; seven hundred and forty-three thousand, two hundred and sixty-nine.

(5) Forty-five thousand; thirty-two thousand, six hundred; seventy-five thousand, two hundred and thirty; five hundred thousand.

(6) Eight millions, five hundred and seventy-two thousand, nine hundred and fourteen; three millions, four hundred and sixty-nine thousand, two hundred and eighteen; four millions, six hundred and twenty-nine thousand, eight hundred and seventeen.

(7) Nine millions; twenty-nine millions; seven hundred and fifteen millions.

(8) Nine hundred and ten millions; three hundred and seven thousand, two hundred and forty; three hundred and seven millions, four thousand, two hundred and five; three hundred and eighty millions, five hundred and three thousand and forty.

(9) Two hundred and forty-three thousand seven hundred and fifty-nine millions, two hundred and sixty-eight thousand, three hundred and forty-two; three hundred and seven thousand, four hundred and five millions, six thousand, two hundred and seventy.

(10) Four hundred and seventeen billions, two hundred and thirty-five thousand, six hundred and eighty-two millions, seven hundred and nineteen thousand, four hundred and thirty-five; two hundred and three billions, fifty-six thousand three hundred millions, seventy-two thousand and ten.

Ex. (ii), p. 6.

(1) 9, 12, 17, 19, 13, 16, 11.
(2) 23, 27, 35, 38, 44, 40, 26, 34.
(3) 67, 75, 62, 83, 74, 92, 68, 95.
(4) 76, 22, 50, 15, 28, 61, 49, 18, 90, 73.
(5) 107, 130, 246, 372, 608, 740, 990.
(6) 836, 747, 410, 913, 750, 384.
(7) 818, 808, 206, 430, 512, 787.
(8) 7845, 9637, 12 000, 8400, 6003, 85 040.
(9) 5470, 3650, 8780, 1247, 4808.
(10) 6004, 7022, 3500, 9047, 2017, 19 402.
(11) 70 007, 60 060, 14 014, 70 017, 12 303, 16 005.
(12) 356 728, 640 842, 900 000, 800 040.
(13) 7 000 000, 4 576 865, 75 806 940.
(14) 315000000, 5040000, 8000700, 18000020, 700000002.
(15) 315 674 018 003, 35 600 000 520.
(16) 7 000 000 000 000, 5 800 000 600 047, 8 000 000 043 007.
(17) 305 005 004 006 003, 53 000 053 053 053.
(18) 9000000000009, 90 000 000 000 900, 19000000019000, 1 000001 001 101.

Ex. (iii), p. 9.

1.

(1) Twenty-seven. (2) Forty-nine. (3) Sixty-eight.
(4) Seventy-three. (5) Ninety-two.
(6) One hundred and forty-four.
(7) One hundred and sixty-three.

(8) One hundred and ninety-nine.
(9) Six hundred and sixty-four.
(10) One thousand eight hundred and seventy-two.

2.

(1) XXXVII.
(2) LIX.
(3) LXII.
(4) LXXXVII.
(5) XCV.
(6) CXXXIX.
(7) CXLV.
(8) CLXXIX.
(9) DCCCXLVI.
(10) MDCCLXIII.

Ex. (iv), p. 10.

(1) 11, 16, 20, 36.
(2) 98.
(3) 67.
(4) 60.
(5) 1409.
(6) 949.
(7) 738.
(8) 4971.
(9) 23 406.
(10) 74 338.
(11) 2008.
(12) 3310.
(13) 1671.
(14) 880.
(15) 28 493.
(16) 33 633.
(17) 28 206.
(18) 18 526.
(19) 208.
(20) 1163.
(21) 9289.
(22) 12 932.
(23) 106 384.
(24) 59 313.
(25) 284 271.
(26) 1 450 741.
(27) 680077 891.
(28) 1 843 088.
(29) 1 979 628.
(30) 1 184 946.
(31) 3 782 272.
(32) 3 476 908.
(33) 799 819.
(34) 50 333 150.
(35) 20 826 857.
(36) 14 621 293.

(37)
$$\begin{array}{r} 740 \\ 40015 \\ 647 \\ 53303 \\ 17546 \\ \hline 112251 \end{array}$$

(38)
$$\begin{array}{r} 508 \\ 6009 \\ 55014 \\ 819 \\ 700006 \\ 2012 \\ \hline 764368 \end{array}$$

(39)
$$\begin{array}{r} 645845 \\ 70047 \\ 60040 \\ 750000 \\ 300015 \\ \hline 1825947 \end{array}$$

(40)
$$\begin{array}{r} 201096342 \\ 54304 \\ 18006003 \\ 500040 \\ 8000008 \\ \hline 227656697 \end{array}$$

Ex. (v), p. 14.

(1) 7. (2) 8. (3) 19. (4) 29.
(5) 34. (6) 54. (7) 35. (8) 29.
(9) 45. (10) 66. (11) 509. (12) 82.
(13) 3808. (14) 2112. (15) 4228. (16) 6222.
(17) 61 471. (18) 108. (19) 2779. (20) 28 828.
(21) 2761. (22) 381. (23) 46. (24) 32.
(25) 2042. (26) 6457. (27) 5780. (28) 51 195.
(29) 10 999. (30) 1096. (31) 18 467. (32) 60 023.
(33) 775 772. (34) 1.

(35) $\begin{array}{r} 1000000 \\ 1000 \\ \hline 999000 \end{array}$ (36) $\begin{array}{r} 100000000 \\ 100000 \\ \hline 99900000 \end{array}$ (37) $\begin{array}{r} 10000000000 \\ 1001 \\ \hline 9999998999 \end{array}$

(38) $\begin{array}{r} 26 \\ 18 \\ \hline 8 \end{array}$ (39) $\begin{array}{r} 427 \\ 401 \\ \hline 26 \end{array}$ (40) $\begin{array}{r} 3015 \\ 2405 \\ \hline 610 \end{array}$

(41) $\begin{array}{r} 1000 \\ 407 \\ \hline 593 \end{array}$ (42) $\begin{array}{r} 586 \\ 427 \\ \hline 159 \end{array}$ (43) $\begin{array}{r} 8047 \\ 7428 \\ \hline 619 \end{array}$

Ex. (vi), p. 18.

(1) 45. (2) 304. (3) 490. (4) 870
(5) 684. (6) 861. (7) 9273. (8) 11364.
(9) 50, 75, 175, 225.
(10) 635, 1016, 1270, 1397, 2540, 8890.
(11) 9868, 14 802, 27 137, 29 604. 1 233 500, 17 269 000.
(12) 336861, 411719, 449148, 1871450000, 2994320000000.

Ex. (vii), p. 19.

(1) $\begin{array}{r} 23 \\ 15 \\ \hline 115 \\ 23 \\ \hline 345 \end{array}$ (2) $\begin{array}{r} 37 \\ 29 \\ \hline 333 \\ 74 \\ \hline 1073 \end{array}$ (3) $\begin{array}{r} 45 \\ 36 \\ \hline 270 \\ 135 \\ \hline 1620 \end{array}$ (4) $\begin{array}{r} 70 \\ 26 \\ \hline 420 \\ 140 \\ \hline 1820 \end{array}$

```
(5)   125
       24
      ---
      500
     250
     ----
     3000
```

```
(6)   327
       42
      ---
      654
    1308
    -----
    13734
```

```
(7)   205
       43
      ---
      615
     820
     ----
     8815
```

```
(8)   307
       98
     ----
     2456
    2763
    -----
    30086
```

```
(9)   2684
        35
     -----
     13420
     8052
     -----
     93940
```

```
(10)  57296
         27
     ------
     401072
    114592
    -------
    1546992
```

```
(11)  84293
         88
     ------
     674344
    674344
    -------
    7417784
```

```
(12)  7629302
           76
    ---------
     45775812
    53405114
    ---------
    579826952
```

Ex. (viii), p. 20.

```
(1)   326
      532
      ---
      652
     978
    1630
    ------
    173432
```

```
(2)   704
      176
     ----
     4224
    4928
    704
    ------
    123904
```

```
(3)   809
      506
     ----
     4854
    4045
    ------
    409354
```

```
(4)   917
      406
     ----
     5502
    3668
    ------
    372302
```

```
(5)   5376
       423
     -----
     16128
    10752
   21504
   -------
   2274048
```

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(6)   7846
       340
    ------
    313840
   23538
   -------
   2667640
```

(7)
7859
5006

47154
39295

39342154

(8)
85639
598

685112
770751
428195

51212122

(9)
79802
4007

558614
319208

319766614

(10)
30207
5060

1812420
151035

152847420

(11)
642867
90807

4500069
5142936
5785803

58376823669

(12)
8637405
40300

2591221500
34549620

348087421500

(13)
970052
40072

1940104
6790364
3880208

38871923744

(14)
980740
3406

5884440
3922960
2942220

3340400440

(15)
9864302
300071

9864302
69050114
29592906

2959990965442

(16)
870120506
700403

2610361518
3480482024
6090843542

609435012763918

(17)
32804070
409300

9841221000
295236630
131216280

13426705851000

(18)

```
   742349
      947
  5196443
 2969396
6681141
703004503
```

(19)

```
    578628
      6205
   2893140
 1157256
3471768
3590386740
```

(20)

```
    428734
      8057
   3001138
  2143670
3429872
3454309838
```

(21)

```
    984236
      5009
   8858124
4921180
4930038124
```

(22)

```
     872469
      70043
    2617407
   3489876
5107283
61110346167
```

(23)

```
     385704
      36479
    3471336
   2699928
  1542816
 2314224
1157112
14070096216
```

(24)

```
     423796
      57243
    1271388
   1695184
   847592
 2966572
2118980
24259354428
```

(25)

```
      620072
      400205
     3100360
   1240144
2480288
248155914760
```

(26)

```
      270403
      502049
     2433627
    1081612
   540806
1352015
135755555747
```

(27)

```
      427964
      582978
     3423712
    2995748
   3851676
   855928
 3423712
2139820
249493596792
```

Ex. (ix), p. 21.

```
(1)   18        (2)    436      (3)     3476
      19                73                2300
     ---              ----          ---------
     162              1308           1042800
     18              3052            6952
     ---             -----          --------
     342             31828           7994800
      20                12              70010
     ---            ------          ---------
    6840            381936           79948000
                         5         55963600
                   -------         ------------
                   1909680         559715948000
                                           2003
                                 ----------------
                                   1679147844000
                                 1119431896000
                                 ----------------
                                 1121111043844000
```

Ex. (x), p. 22.

```
(1)   15        (2)   24        (3)   40
      15              24                40
     ---             ---             -----
      75              96              1600
     15              48
     ---             ---
     225             576

(4)   57        (5)   69        (6)   72
      57              69                72
    ----            ----              ----
     399             621               144
    285             414               504
    ----            ----              ----
    3249            4761              5184
```

```
(7)    87
       87
      ----
      609
     696
     ----
     7569
```

```
(8)   100
        100
      -----
      10000
```

```
(9)    114
       114
       ---
       456
      114
     114
     -----
     12996
```

```
(10)   237
       237
      ----
      1659
      711
     474
     -----
     56169
```

```
(11)    625
        625
       ----
       3125
      1250
     3750
     ------
     390625
```

```
(12)   897
       897
      ----
      6279
     8073
    7176
    ------
    804609
```

```
(13)     789
         789
        ----
        7101
       6312
      5523
      ------
      622521
```

```
(14)   11
       11
       ---
       121
       11
      ----
      1331
```

```
(15)   13
       13
       ---
       169
        13
       ---
       507
      169
      ----
      2197
```

```
(16)     25
         25
        ---
        125
        50
        ---
        625
         25
       ----
       3125
      1250
      -----
      15625
```

```
(17)      47
          47
         ---
         329
        188
        ----
        2209
          47
       -----
       15463
       8836
      ------
      103823
```

```
(18)      68
          68
         ---
         544
        408
        ----
        4624
          68
       -----
       36992
      27744
      ------
      314432
```

(19)

$$\begin{array}{r} 93 \\ 93 \\ \hline 279 \\ 837 \\ \hline 8649 \\ 93 \\ \hline 25947 \\ 77841 \\ \hline 804357 \end{array}$$

(20)

$$\begin{array}{r} 100 \\ 100 \\ \hline 10000 \\ 100 \\ \hline 1000000 \end{array}$$

(21)

$$\begin{array}{r} 257 \\ 257 \\ \hline 1799 \\ 1285 \\ 514 \\ \hline 66049 \\ 257 \\ \hline 462343 \\ 330245 \\ 132098 \\ \hline 16974593 \end{array}$$

(22)

$$\begin{array}{r} 356 \\ 356 \\ \hline 2136 \\ 1780 \\ 1068 \\ \hline 126736 \\ 356 \\ \hline 760416 \\ 633680 \\ 380208 \\ \hline 45118016 \end{array}$$

(23)

$$\begin{array}{r} 539 \\ 539 \\ \hline 4851 \\ 1617 \\ 2695 \\ \hline 290521 \\ 539 \\ \hline 2614689 \\ 871563 \\ 1452605 \\ \hline 156590819 \end{array}$$

(24)

$$\begin{array}{r} 704 \\ 704 \\ \hline 2816 \\ 4928 \\ \hline 495616 \\ 704 \\ \hline 1982464 \\ 3469312 \\ \hline 348913664 \end{array}$$

(25)

$$\begin{array}{r} 987 \\ 987 \\ \hline 6909 \\ 7896 \\ 8883 \\ \hline 974169 \\ 987 \\ \hline 6819183 \\ 7793352 \\ 8767521 \\ \hline 961504803 \end{array}$$

Ex. (xi), p. 25.

(1) 3. (2) 3. (3) 12. (4) 11.

(5) 13) 182 (14
13
52
52

(6) 17) 238 (14
17
68
68

(7) 19) 456 (24
38
76
76

(8) 36) 3708 (103
36
108
108

(9) 37) 3996 (108
37
296
296

(10) 493) 6409 (13
493
1479
1479

(11) 817) 431376 (528
4085
2287
1634
6536
6536

(12) 946) 976272 (1032
946
3027
2838
1892
1892

(13) 342) 19249470 (56285
1710
2149
2052
974
684
2907
2736
1710
1710

(14) 358) 86366784 (241248
716
1476
1432
446
358
887
716
1718
1432
2864
2864

```
(15) 489) 224009433 ( 458097
          1956
          ----
           2840
           2445
           ----
            3959
            3912
            ----
             4743
             4401
             ----
              3423
              3423
              ----
```

```
(16) 618) 4690325214 ( 7589523
          4326
          ----
           3643
           3090
           ----
            5532
            4944
            ----
             5885
             5562
             ----
              3232
              3090
              ----
               1421
               1236
               ----
                1854
                1854
                ----
```

```
(17) 1369) 2880376 ( 2104
           2738
           ----
            1423
            1369
            ----
              5476
              5476
              ----
```

```
(18) 6142) 107810526 ( 17553
           6142
           -----
           46390
           42994
           -----
            33965
            30710
            -----
             32552
             30710
             -----
              18426
              18426
              -----
```

```
(19) 4123) 98955005667 ( 24000729
           8246
           -----
           16495
           16492
           ---------
              30056
              28861
              -----
               11956
                8246
               -----
                37107
                37107
                -----
```

(20) 2019) 4076361 (2019
4038
3836
2019
18171
18171

(21) 237) 13312053 (56169
1185
1462
1422
400
237
1635
1422
2133
2133

(22) 89) 505350366 (5678094
445
603
534
695
623
720
712
836
801
356
356

(23) 83) 360919856 (4348432
332
289
249
401
332
699
664
358
332
265
249
166
166

(24) 907) 4600304 (5072
4535
6530
6349
1814
1814

```
(25)  689 ) 218860161 ( 317649
            2067
            ----
             1216
              689
             ----
              5270
              4823
              ----
               4471
               4134
               ----
                3376
                2756
                ----
                 6201
                 6201
                 ----
```

```
(26)  861 ) 337103025 ( 391525
            2583
            ----
             7880
             7749
             ----
              1313
               861
              ----
               4520
               4305
               ----
                2152
                1722
                ----
                 4305
                 4305
                 ----
```

```
(27)  1001 ) 39916424548 ( 39876548
             3003
             ----
              9886
              9009
              ----
               8774
               8008
               ----
                7662
                7007
                ----
                 6554
                 6006
                 ----
                  5485
                  5005
                  ----
                   4804
                   4004
                   ----
                    8008
                    8008
                    ----
```

```
(28)  5060 ) 152847420 (30207
             15180
             -----
               10474
               10120
               -----
                 35420
                 35420
                 -----
```

(29) 7649) 26540538445 (3469805
22947
35935
30596
53393
45894
74998
68841
61574
61192
38245
38245

(30) 17072) 1165584398000 (68274625
102432
141264
136576
46883
34144
127399
119504
78958
68288
106700
102432
42680
34144
85360
85360

(31) 74291) 35088008823434 (472304974
297164
537160
520037
171238
148582
226568
222873
369523
297164
723594
668619
549753
520037
297164
297164

(32) 65432) 369187022085112 (5642300741
327160

420270
392592

276782
261728

150542
130864

196780
196296

484851
458024

268271
261728

65432
65432

(33) 98989) 837741356152459 (8462974231
791912

458293
395956

623375
593934

294416
197978

964381
890901

734805
692923

418822
395956

228664
197978

306865
296967

98989
98989

(34) 642867) 58376823669 (90807
5785803
5187936
5142936
4500069
4500069

(35) 9864302) 2959990965442 (300071
29592906
70036544
69050114
9864302
9864302

(36) 8723694) 261449109180 (29970
17447388
86975229
78513246
84619831
78513246
61065858
61065858

Ex. (xii), p. 25.

(1) 342) 1171692 (3426
1026
1456
1368
889
684
2052
2052

(2) 23) 149201 (6487
138
112
92
200
184
161
161

(3)
64852
987
453964
518816
583668
64008924

Ex. (xiii), p. 27.

(1) 2|7652
3826

(2) 3|725961
241987

(3) 4|8650232
2162558

(4) 5|8749320
1749864

(5) 6|7463424
1243904

(6) 7|3504221
500603

(7) 9|713406960
79267440

(8) 11|4362017
396547

(9) 12|7912464
659372

(10) 9|4000623070905
444513674545

(11) 11|7642300721
694754611

(12) 12|36089882405604
3007490200467

(13) 2|4263924
2131962

3|4263924
1421308

4|4263924
1065981

(14) 2|620437548
310218774

3|620437548
206812516

4|620437548
155109387

(15) 2|27540918264
13770459132

3|27540918264
91803060088

4|27540918264
68852295066

(16) 5|46528920
9305784

8|46528920
5816115

9|46528920
5169880

(17)	$5\,\big|\underline{981754200}$ 196350840	$8\,\big|\underline{981754200}$ 122719275	$9\,\big|\underline{981754200}$ 109083800
(18)	$5\,\big|\underline{234567000}$ 46913400	$8\,\big|\underline{234567000}$ 29320875	$9\,\big|\underline{234567000}$ 26063000
(19)	$7\,\big|\underline{7971348}$ 1138764	$11\,\big|\underline{7971348}$ 724668	$12\,\big|\underline{7971348}$ 664279
(20)	$7\,\big|\underline{29574468}$ 4224924	$11\,\big|\underline{29574468}$ 2688588	$12\,\big|\underline{29574468}$ 2464539
(21)	$7\,\big|\underline{6736387812}$ 962341116	$11\,\big|\underline{6736387812}$ 612398892	$12\,\big|\underline{6736387812}$ 561365651

Ex. (xiv), p. 28.

(1)

$$\begin{array}{r} 27543 \\ \underline{497} \\ 192801 \\ 247887 \\ \underline{110172} \\ 13688871 \end{array}$$

(2)

$$\begin{array}{r} 34682 \\ \underline{4021} \\ 34682 \\ 69364 \\ \underline{138728} \\ 139456322 \end{array}$$

(3)

$$\begin{array}{r} 7549 \\ \underline{206} \\ 45294 \\ \underline{15098} \\ 1555094 \end{array}$$

(4)

$$\begin{array}{r} 20051 \\ \underline{3070} \\ 1403570 \\ \underline{60153} \\ 61556570 \end{array}$$

(5)

$$\begin{array}{r} 4372 \\ \underline{2483} \\ 13116 \\ 34976 \\ 17488 \\ \underline{8744} \\ 10855676 \end{array}$$

(6)

$$\begin{array}{r} 5072 \\ \underline{3123} \\ 15216 \\ 10144 \\ 5072 \\ \underline{15216} \\ 15839856 \end{array}$$

Ex. (xv), p. 30.

(1) 3, 9. (2) 2, 3, 4, 8, 9. (3) 3, 5, 9, 11.
(4) 2, 3, 5, 10. (5) 2, 3, 4, 8, 9. (6) 3, 5, 9.
(7) 2, 4, 8. (8) 5. (9). 2, 3, 4.
(10) 2, 3, 4, 5, 8, 9. (11) 2, 11.

Ex. (xvi), p. 30.

(1) 2, 3, 3.
(2) 2, 2, 2, 3.
(3) 3, 3, 3.
(4) 2, 2, 2, 2, 2.
(5) 2, 2, 3, 3.
(6) 3, 13.
(7) 2, 3, 7.
(8) 3, 17.
(9) 2, 3, 3, 3.
(10) 3, 19.
(11) 2, 2, 2, 3, 3.
(12) 5, 17.
(13) 7, 13.
(14) 3, 3, 11.
(15) 2, 2, 5, 5.
(16) 3, 5, 7.
(17) 2, 2, 3, 3, 3.
(18) 2, 2, 2, 2, 7.
(19) 2, 2, 3, 11.
(20) 2, 2, 2, 2, 11.
(21) 2, 2, 2, 2, 2, 3, 3.
(22) 2, 2, 2, 2, 3, 3, 3.
(23) 3, 5, 5, 7.
(24) 5, 5, 5, 5.
(25) 3, 3, 3, 3, 3, 3.
(26) 3, 3, 3, 37.
(27) 2, 2, 2, 2, 3, 3, 3, 3.
(28) 2, 2, 2, 2, 2, 5, 11.
(29) 2, 2, 2, 2, 2, 2, 2, 3, 3, 5.

Ex. (xvii), p. 31.

(1)
$$\begin{array}{r} 347\\ 7\\ \hline 2429\\ 2\\ \hline 4858 \end{array}$$

(2)
$$\begin{array}{r} 423\\ 11\\ \hline 4653\\ 2\\ \hline 9306 \end{array}$$

(3)
$$\begin{array}{r} 5462\\ 9\\ \hline 49158\\ 3\\ \hline 147474 \end{array}$$

(4)
$$\begin{array}{r} 8497\\ 9\\ \hline 76473\\ 4\\ \hline 305892 \end{array}$$

(5)
$$\begin{array}{r} 8573\\ 7\\ \hline 60011\\ 7\\ \hline 420077 \end{array}$$

(6)
$$\begin{array}{r} 28472\\ 8\\ \hline 227776\\ 7\\ \hline 1594432 \end{array}$$

(7)
$$\begin{array}{r} 49273\\ 9\\ \hline 443457\\ 7\\ \hline 3104199 \end{array}$$

(8)
$$\begin{array}{r} 90728\\ 12\\ \hline 1088736\\ 11\\ \hline 11976096 \end{array}$$

(9)
$$\begin{array}{r} 90725\\ 12\\ \hline 1088700\\ 3\\ \hline 3266100\\ 10\\ \hline 32661000 \end{array}$$

(10)
$$\begin{array}{r} 40207\\ 12\\ \hline 482484\\ 9\\ \hline 4342356 \end{array}$$

(11)
$$\begin{array}{r} 36729\\ 12\\ \hline 440748\\ 11\\ \hline 4848228\\ 10\\ \hline 8482280 \end{array}$$

(12)
$$\begin{array}{r} 704075\\ 12\\ \hline 8448900\\ 12\\ \hline 101386800\\ 100\\ \hline 10138680000 \end{array}$$

Ex. (xviii), p. 32.

(1)
$$\begin{array}{r|l} 2 & 34608 \\ \hline 7 & 17304 \\ \hline & 2472 \end{array}$$

(2)
$$\begin{array}{r|l} 3 & 6791040 \\ \hline 5 & 2263680 \\ \hline & 452736 \end{array}$$

(3)
$$\begin{array}{r|l} 3 & 752364576 \\ \hline 6 & 250788192 \\ \hline & 41798032 \end{array}$$

(4)
$$\begin{array}{r|r} 9 & 1143995886 \\ \hline 3 & 127110654 \\ \hline & 42370218 \end{array}$$

(5)
$$\begin{array}{r|r} 11 & 285216822 \\ \hline 3 & 25928802 \\ \hline & 8642934 \end{array}$$

(6)
$$\begin{array}{r|r} 7 & 2095501072 \\ \hline 7 & 299357296 \\ \hline & 42765328 \end{array}$$

(7)
$$\begin{array}{r|r} 8 & 4157028792 \\ \hline 7 & 519628599 \\ \hline & 74232657 \end{array}$$

(8)
$$\begin{array}{r|r} 12 & 1200130008 \\ \hline 7 & 100010834 \\ \hline & 14287262 \end{array}$$

(9)
$$\begin{array}{r|r} 9 & 22039992 \\ \hline 12 & 2448888 \\ \hline & 204074 \end{array}$$

(10)
$$\begin{array}{r|r} 12 & 57667632 \\ \hline 11 & 4805636 \\ \hline & 436876 \end{array}$$

(11)
$$\begin{array}{r|r} 5 & 472634500 \\ \hline 5 & 94526900 \\ \hline 5 & 18905380 \\ \hline & 3781076 \end{array}$$

(12)
$$\begin{array}{r|r} 10 & 565184160 \\ \hline 8 & 56518416 \\ \hline 9 & 7064802 \\ \hline & 784978 \end{array}$$

(13)
$$\begin{array}{r|r} 100 & 537062400 \\ \hline 12 & 5370624 \\ \hline 12 & 447552 \\ \hline & 37296 \end{array}$$

Ex. (xix), p. 33.

(1) 37) 3492 (94
333
162
148
14

(2) 41) 486296 (11860
41
76
41
352
328
249
246
36

(3) 47) 872968 (18573
47
402
376
269
235
346
329
178
141
37

(4) 65) 57092 (878
520
509
455
542
520
22

(5) 71) 7492736 (105531
71
392
355
377
355
223
213
106
71
35

(6) 98) 82749325 (844380
784
434
392
429
392
373
294
792
784
85

```
(7)  103) 87467 ( 849
          824
          ---
           506
           412
           ---
            947
            927
            ---
             20
```

```
(8)  409) 978462 ( 2392
          818
          ----
          1604
          1227
          ----
           3776
           3681
           ----
             952
             818
             ---
             134
```

```
(9)  723) 8276253 ( 11447
          723
          ----
          1046
           723
          ----
           3232
           2892
           ----
            3405
            2892
            ----
             5133
             5061
             ----
               72
```

```
(10)  1009) 974004562 ( 965316
            9081
            ----
             6590
             6054
             ----
              5364
              5045
              ----
               3195
               3027
               ----
                1686
                1009
                ----
                 6772
                 6054
                 ----
                  718
```

```
(11)  4821) 48237654 ( 10005
            4821
            -----
              27654
              24105
              -----
               3549
```

(12) 6871) 68725642903 (10002276
6871

15642
13742

19009
13742

52670
48097

45733
41226

4507

Ex. (xx), p. 33.

(1) 3 | 4153
5 | 1384 and 1 unit over.
276 and 4 parcels of 3 units, or 12 units over.

(2) 4 | 587595
4 | 146898 and 3 units over.
36724 and 2 parcels of 4 units, or 8 units over.

(3) 9 | 42813
2 | 4757 and no units over.
2378 and 1 parcel of 9 units over.

(4) 7 | 423672
3 | 60524 and 4 units over.
20174 and 2 parcels of 7 units, or 14 units over.

(5) 5 | 724972
5 | 144994 and 2 units over.
28998 and 4 parcels of 5 units, or 20 units over.

(6) 9 | 569024971
3 | 63224996 and 7 units over.
21074998 and 2 parcels of 9 units, or 18 units over.

(7) 3 | 2825780
11 | 941926 and 2 units over.
85629 and 7 parcels of 3 units, or 21 units over.

(8) 7 | 8642396
5 | 1234628 and no units over.
246925 and 3 parcels of 7 units, or, 21 units over.

(9) 6 | 356599
8 | 59433 and 1 unit over.
7429 and 1 parcel of 6 units over.

(10) 8 | 8274913
8 | 1034364 and 1 unit over.
129295 and 4 parcels of 8 units, or, 32 units over.

(11) 11 | 230047914
7 | 20913446 and 8 units over.
2987635 and 1 parcel of 11 units over.

(12) 11 | 419421
9 | 38129 and 2 units over.
4236 and 5 parcels of 11 units, or, 55 units over.

(13) 7 | 44487
3 | 6355 and 2 units over.
5 | 2118 and 1 parcel of 7 units over.
423 and 3 parcels of 21 units, or 63 units over.

(14)
$$\begin{array}{r|rl} 9 & 95379 & \\ \hline 7 & 10597 & \text{and 6 units over.} \\ \hline 3 & 1513 & \text{and 6 parcels of 9 units, or, 54 units over.} \\ \hline & 504 & \text{and 1 parcel of 63 units over.} \end{array}$$

(15)
$$\begin{array}{r|rl} 10 & 1194477 & \\ \hline 7 & 119447 & \text{and 7 units over.} \\ \hline 3 & 17063 & \text{and 6 parcels of 10 units, or, 60 units over.} \\ \hline & 5687 & \text{and 2 parcels of 70 units, or, 140 units over.} \end{array}$$

Ex. (xxi), p. 35.

(1) Remainder = $4276 - (171 \times 25) = 4276 - 4275 = 1$.

(2) Dividend = $(1381 \times 342) + 67 = 472302 + 67 = 4723069$.

(3) Quotient = $(372149 - 245) \div 596 = 371904 \div 596 = 624$.

(4) Divisor = $(8765237 - 317) \div 2910 = 8764920 \div 2910 = 3012$.

Examination Papers, p. 35.

(A)

(1) Four millions, two hundred and thirty-seven thousand, four hundred and ninety-six; 653812.

(2)
$$\begin{array}{r} 24753 \\ 86729 \\ 4237 \\ 80462 \\ \hline 196181 \end{array}$$

(3)
$$\begin{array}{r} 86293 \\ 78464 \\ \hline 7829 \end{array}$$

(4)
$$\begin{array}{r} 8627 \\ 493 \\ \hline 25881 \\ 77643 \\ 34508 \\ \hline 4253111 \end{array}$$

(4)
$$\begin{array}{r} 50042 \\ 307 \\ \hline 350294 \\ 150126 \\ \hline 15362894 \end{array}$$

(5) 358) 2659582 (7429
2506
1535
1432
1038
716
3222
3222

(5) 9 | 8423793
935977

(B)

(1) 25257630; four hundred and two millions, fifty thousand four hundred and seven.

(2) 17000017
8008
16992009

(3) 6549
4037
45843
19647
26196
26438313

(4) 96) 32456789 (338091
288
365
288
776
768
878
864
149
96
53

(3) 27004
3700
18902800
81012
99914800

(4) 8 | 32456789
12 | 4057098 and 5 units over.
338091 and 6 parcels of 8 units over.

```
(5)   1000006
        15011
       100010
        60400
    ---------
  9 | 1175427
    ---------
       130603
```

(C)

(1) Ten thousand and ten millions, two hundred and one thousand, four hundred and one; 1023001

```
10010201401
    1023001
-----------
10011224402
```

```
10011224402
10009178400
-----------
    2046002
```

```
(2)   740296
        2089
     -------
     6662664
    5922368
   1480592
 -----------
  1546478344
```

```
     426004
       3704
    -------
    1704016
  2982028
 1278012
-----------
 1577918816
```

```
(3)  5 | 78297426
       ----------
     7 | 15659485  and 1 unit over.
       ----------
          2237069  and 2 parcels of 5 units over.
```

```
(4)   126406003
       95000004
      ---------
       31405999
```

```
(5)   723
      347
     ----
     5061
    2892
   2169
   ------
   250881
```

```
(5)   4 | 250881
       ---------
     12 |  62720  and 1 unit over
       ---------
            5226  and 8 parcels of 4 units over.
```

(D)

(1) 1888

(2) 12 | 987654321
11 | 82304526 and 9 units over.
7482229 and 7 parcels of 12 units over.

(3) $56 = 2 \times 2 \times 2 \times 7$
$78 = 2 \times 3 \times 13$
$114 = 2 \times 3 \times 19$

(4)
$$\begin{array}{r} 86297 \\ 40025 \\ \hline 126322 \\ 95 \\ \hline 631610 \\ 1136898 \\ \hline 12000590 \end{array} \qquad \begin{array}{r} 789 \\ 694 \\ \hline 95 \end{array}$$

(5)
$$\begin{array}{r} 1000000 \\ 101 \\ \hline 999899 \end{array}$$

(E)

(1) 5406) 353008972602 (65299476
32436
28648
27030
16189
10812
53777
48654
51232
48654
25786
21624
41620
37842
37782
32436
5346

(2)
$$\begin{array}{r} 8976589 \\ 9876 \\ \hline 53859534 \\ 62836123 \\ 71812712 \\ 80789301 \\ \hline 88652792964 \end{array}$$

(3) $40 = 2 \times 2 \times 2 \times 5$
$90 = 2 \times 3 \times 3 \times 5$
$126 = 2 \times 3 \times 3 \times 7$

(4) XXIV, XLVII, CLXXVIII.

(5) $24 \times 500 = 12000$

Ex. (xxii), p. 37.

(1) $8 = 2 \times 4$
$14 = 2 \times 7$

(2) $12 = 6 \times 2$
$30 = 6 \times 5$

(3) $40 = 20 \times 2$
$60 = 20 \times 3$

(4) $36 = 18 \times 2$
$90 = 18 \times 5$

(5) $48 = 48 \times 1$
$144 = 48 \times 3$

(6) $7 = 7 \times 1$
$14 = 7 \times 2$
$21 = 7 \times 3$

(7) $15 = 3 \times 5$
$27 = 3 \times 9$
$105 = 3 \times 35$

(8) $32 = 16 \times 2$
$48 = 16 \times 3$
$128 = 16 \times 8$

(9) $16 = 16 \times 1$
$64 = 16 \times 4$
$256 = 16 \times 16$
$1024 = 16 \times 64$

(10) $24 = 3 \times 8$
$51 = 3 \times 17$
$105 = 3 \times 35$
$729 = 3 \times 243$

Ex. (xxiii), p. 38.

(1)
$$\begin{array}{llll} 384)\,1296\,(3 & & & \\ 1152 & & & \\ \overline{144}\,)\,384\,(2 & & & \\ & 288 & & \\ & \overline{96}\,)\,144\,(1 & & \\ & & 96 & \\ & & \overline{48}\,)\,96\,(2 & \\ & & & 96 \\ & & & \overline{} \end{array}$$

∴ H. C. F. is 48.

```
(2)  2272 ) 3552 ( 1
            2272
            ----
            1280 ) 2272 ( 1
                   1280
                   ----
                    992 ) 1280 ( 1
                           992
                           ---
                           288 ) 992 ( 3
                                 864
                                 ---
                                 128 ) 288 ( 2
                                       256
                                       ---
                                        32 ) 128 ( 4
                                             128
                                             ---
```

∴ H. C. F. is 32.

```
(3)  7455 ) 47223 ( 6
            44730
            -----
             2493 ) 7455 ( 2
                    4986
                    ----
                    2469 ) 2493 ( 1
                           2469
                           ----
                             24 ) 2469 ( 102
                                  24
                                  ----
                                    69
                                    48
                                    --
                                    21 ) 24 ( 1
                                         21
                                         --
                                          3 ) 21 ( 7
                                              21
                                              --
```

∴ H. C. F. is 3.

(4) 12321) 54345 (4
49284
5061) 12321 (2
10122
2199) 5061 (2
4398
663) 2199 (3
1989
210) 663 (3
630
33) 210 (6
198
12) 33 (2
24
9) 12 (1
9
3) 9 (3
9
∴ H. C. F. is 3.

(5) 6906) 10359 (1
6906
3453) 6906 (2
6906
∴ H. C. F. is 3453.

(6) 1908) 2736 (1
1908
828) 1908 (2
1656
252) 828 (3
756
72) 252 (3
216
36) 72 (2
72
∴ H. C. F. is 36.

(7) 49608) 169416 (3
148824
20592) 49608 (2
41184
8424) 20592 (2
16848
3744) 8424 (2
7488
936) 3744 (4
3744
∴ H. C. F. is 936.

(8) 40115) 126025 (3
120345

5680) 40115 (7
39760

355) 5680 (16
355

2130
2130

∴ H. C. F. is 355.

(9) 1581227) 16758766 (10
15812270

946496) 1581227 (1
946496

634731) 946496 (1
634731

311765) 634731 (2
623530

11201

11201) 311765 (27
22402

87745
78407

9338) 11201 (1
9338

1863) 9338 (5
9315

23) 1863 (81
184

23
23

∴ H. C. F. is 23.

(10) 35175) 236845 (6
211050
25795) 35175 (1
25795
9380) 25795 (2
18760
7035) 9380 (1
7035
2345) 7035 (3
7035

∴ H. C. F. is 2345.

Ex. (xxiv), p. 39.

(1) $$\left.\begin{array}{l}\text{The H. C. F. of 16 and 20 is 4}\\ \text{The H. C. F. of 4 and 28 is 4}\end{array}\right\}\ \therefore\ \text{4 is H. C. F.}$$

(2) $$\left.\begin{array}{l}\text{The H. C. F. of 14 and 42 is 14}\\ \text{The H. C. F. of 14 and 56 is 14}\\ \text{The H. C. F. of 14 and 138 is 2}\end{array}\right\}\ \therefore\ \text{2 is H. C. F.}$$

(3) 365) 511 (1
365
146) 365 (2
292
73) 146 (2
146

73) 803 (11
73
73
73

∴ H. C. F. is 73.

(4) 232) 290 (1
232
58) 232 (4
232

58) 493 (8
464
29) 58 (2
58

∴ H. C. F. is 29.

(5) 492) 1476 (3
1476

∴ H. C. F. is 41.

492) 1763 (3
1476
287) 492 (1
287
205) 287 (1
205
82) 205 (2
164
41) 82 (2
82

(6) 148) 444 (3
444

148) 592 (4
592

∴ H. C. F. is 37.

142) 703 (4
592
111) 148 (1
111
37) 111 (3
111

Ex. (xxv), p. 40.

(1) $$\left.\begin{array}{l} 27 = 27 \times 1 \\ 54 = 27 \times 2 \end{array}\right\} \therefore \text{ L. C. M. is } 27 \times 2, \text{ or, } 54.$$

(2) $$\left.\begin{array}{r} 88 = 4 \times 22 \\ 108 = 4 \times 27 \end{array}\right\} \therefore \text{ L. C. M. is } 4 \times 22 \times 27, \text{ or, } 2376.$$

(3) $$\left.\begin{array}{l} 633 = 3 \times 211 \\ 844 = 4 \times 211 \end{array}\right\} \therefore \text{ L. C. M. is } 3 \times 211 \times 4, \text{ or, } 2532.$$

(4) $$\left.\begin{array}{l} 195 = 5 \times 39 = 5 \times 3 \times 13 \\ 735 = 5 \times 147 = 5 \times 3 \times 49 \end{array}\right\} \begin{array}{l} \therefore \text{ L. C. M. is} \\ 15 \times 13 \times 49, \text{ or, } 9555. \end{array}$$

(5) $$\left.\begin{array}{l} 1000 = 5 \times 200 = 5 \times 5 \times 40 = 5 \times 5 \times 5 \times 8 \\ 2125 = 5 \times 425 = 5 \times 5 \times 85 = 5 \times 5 \times 5 \times 17 \end{array}\right\}$$

∴ L. C. M. is 1000 × 17, or, 17000.

(6) 3432) 3575 (1
3432
143) 3432 (24
286
572
572

∴ L. C. M. is 24 × 3575, or, 85800.

(7) 936) 2925 (3
2808
117) 936 (8
936

∴ L. C. M. is 8 × 2925, or, 23400.

(8) 2304) 4032 (1
2304
1728) 2304 (1
1728
576) 1728 (3
1728

Now 4302 = 576 × 7

∴ L. C. M. is 2304 × 7, or, 16128.

(9) 2443) 4537 (1
2443
2094) 2443 (1
2094
349) 2094 (6
2094

Now 2443 ÷ 349 = 7

∴ L. C. M. is 4537 × 7, or, 31759.

Ex. (xxvi), p. 41.

(1)

$$\begin{array}{r|l} 2 & 6,\ 9,\ 24,\ 40 \\ \hline 2 & 3,\ 9,\ 12,\ 20 \\ \hline 2 & 3,\ 9,\ 6,\ 10 \\ \hline 3 & 3,\ 9,\ 3,\ 5 \\ \hline & 1,\ 3,\ 1,\ 5 \end{array}$$

$\therefore$ L. C. M. is 2 × 2 × 2 × 3 × 3 × 5, or, 360.

(2)

$$\begin{array}{r|l} 2 & 8,\ 12,\ 22,\ 55 \\ \hline 2 & 4,\ 6,\ 11,\ 55 \\ \hline 11 & 2,\ 3,\ 11,\ 55 \\ \hline & 2,\ 3,\ 1,\ 5 \end{array}$$

$\therefore$ L. C. M. is 2 × 2 × 11 × 2 × 3 × 5, or, 1320.

(3)

$$\begin{array}{r|l} 2 & 12,\ 18,\ 96,\ 144 \\ \hline 2 & 6,\ 9,\ 48,\ 72 \\ \hline 2 & 3,\ 9,\ 24,\ 36 \\ \hline 2 & 3,\ 9,\ 12,\ 18 \\ \hline 3 & 3,\ 9,\ 6,\ 9 \\ \hline 3 & 1,\ 3,\ 2,\ 3 \\ \hline & 1,\ 1,\ 2,\ 1 \end{array}$$

$\therefore$ L. C. M. is 2 × 2 × 2 × 2 × 3 × 3 × 2, or, 288.

(4)

$$\begin{array}{r|l} 2 & 16,\ 30,\ 48,\ 56,\ 72 \\ \hline 2 & 8,\ 15,\ 24,\ 28,\ 36 \\ \hline 2 & 4,\ 15,\ 12,\ 14,\ 18 \\ \hline 2 & 2,\ 15,\ 6,\ 7,\ 9 \\ \hline 3 & 1,\ 15,\ 3,\ 7,\ 9 \\ \hline & 1,\ 5,\ 1,\ 7,\ 3 \end{array}$$

$\therefore$ L. C. M. is 16 × 3 × 5 × 7 × 3, or, 5040.

(5)
$$\begin{array}{r|l}
2 & 84,\ 156,\ 63,\ 99 \\ \hline
2 & 42,\ 78,\ 63,\ 99 \\ \hline
3 & 21,\ 39,\ 63,\ 99 \\ \hline
3 & 7,\ 13,\ 21,\ 33 \\ \hline
7 & 7,\ 13,\ 7,\ 11 \\ \hline
 & 1,\ 13,\ 1,\ 11
\end{array}$$

∴ L. C. M. is 36 × 7 × 13 × 11, or, 36036.

(6)
$$\begin{array}{r|l}
2 & 27,\ 33,\ 54,\ 69,\ 132 \\ \hline
3 & 27,\ 33,\ 27,\ 69,\ 66 \\ \hline
9 & 9,\ 11,\ 9,\ 23,\ 22 \\ \hline
11 & 1,\ 11,\ 1,\ 23,\ 22 \\ \hline
 & 1,\ 1,\ 1,\ 23,\ 2
\end{array}$$

∴ L. C. M. is 6 × 9 × 11 × 46, or, 27324.

(7)
$$\begin{array}{r|l}
3 & 17,\ 51,\ 119,\ 210 \\ \hline
7 & 17,\ 17,\ 119,\ 70 \\ \hline
17 & 17,\ 17,\ 17,\ 10 \\ \hline
 & 1,\ 1,\ 1,\ 10
\end{array}$$

∴ L. C. M. is 21 × 17 × 10, or, 3570.

(8)
$$\begin{array}{r|l}
2 & 15,\ 26,\ 39,\ 65,\ 180 \\ \hline
3 & 15,\ 13,\ 39,\ 65,\ 90 \\ \hline
5 & 5,\ 13,\ 13,\ 65,\ 30 \\ \hline
13 & 1,\ 13,\ 13,\ 13,\ 6 \\ \hline
 & 1,\ 1,\ 1,\ 1,\ 6
\end{array}$$

∴ L. C. M. is 30 × 13 × 6, or, 2340.

(9)

$$\begin{array}{r|rrrrr}
2 & 44, & 126, & 198, & 280, & 330 \\ \hline
2 & 22, & 63, & 99, & 140, & 165 \\ \hline
3 & 11, & 63, & 99, & 70, & 165 \\ \hline
3 & 11, & 21, & 33, & 70, & 55 \\ \hline
5 & 11, & 7, & 11, & 70, & 55 \\ \hline
7 & 11, & 7, & 11, & 14, & 11 \\ \hline
11 & 11, & 1, & 11, & 2, & 11 \\ \hline
 & 1, & 1, & 1, & 2, & 1
\end{array}$$

∴ L. C. M. is 36 × 5 × 7 × 11 × 2, or, 27720.

(10)

$$\begin{array}{r|rrrrr}
2 & 50, & 338, & 675, & 702, & 975 \\ \hline
3 & 25, & 169, & 675, & 351, & 975 \\ \hline
3 & 25, & 169, & 225, & 117, & 325 \\ \hline
3 & 25, & 169, & 75, & 39, & 325 \\ \hline
25 & 25, & 169, & 25, & 13, & 325 \\ \hline
13 & 1, & 169, & 1, & 13, & 13 \\ \hline
 & 1, & 13, & 1, & 1, & 1
\end{array}$$

∴ L. C. M. is 54 × 25 × 13 × 13, or, 228150.

Examination Papers, p. 41.

I.

(1)

$$\begin{array}{r}
10010010 \\
768008 \\ \hline
9242002
\end{array}$$

(2)

$$\begin{array}{r}
2014008 \\
769070 \\ \hline
140980560 \\
18126072 \\
12084048 \\
14098056 \\ \hline
\end{array}$$

$$\begin{array}{l}
769070)\,1548913132560\,(\,2014008 \\
1538140 \\ \hline
1077313 \\
769070 \\ \hline
3082432 \\
3076280 \\ \hline
6152560 \\
6152560 \\ \hline
\end{array}$$

(3) 3432) 3575 (1
3432
143) 3432 (24
286
572
572

∴ L. C. M. is 143.

(4)

4	48, 132, 63, 99
3	12, 33, 63, 99
3	4, 11, 21, 33
11	4, 11, 7, 11
	4, 1, 7, 1

∴ L. C. M. is 36 × 11 × 4 × 7, or, 11088.

(5) 28701
2342
57402
114804
86103
57402
67217742
2099
67219841

II.

(1) 72122
8193
216366
649098
5841882
590895546

(1) 8193
72122
16386
98316
589896
590895546

(2)

4	18342 67
9	458566 and 3 units over.
	50951 and 7 parcels of 4 units over.

(3) 1875) 2425 (1
1875
550) 1875 (3
1650
225) 550 (2
450
100) 225 (2
200
25) 100 (4
100

∴ H. C. F. is 25.

(4)

2	6, 18, 22, 99
3	3, 9, 11, 99
3	1, 3, 11, 33
11	1, 1, 11, 11
	1, 1, 1, 1

∴ L. C. M. is 18 × 11, or 198.

(5) The numbers are 3604, 3640, 3064, 3046, 3460, 3406
6304, 6340, 6034, 6043, 6430, 6403
4360, 4306, 4630, 4603, 4036, 4063
of which the sum is 83772.

III.

(1)
2029
847
1182

(2)

7	79875
9	11410 and 5 units over.
	1267 and 7 parcels of 7 units over.

(3) Ten millions, twenty thousand and thirty; ten billions, twenty thousand and thirty millions, forty thousand and fifty.

(4) 1632) 2976 (1
1632
1344) 1632 (1
1344
288) 1344 (4
1152
192) 288 (1
192
96) 192 (2
192

. C. F. is 96.

(5) 2 | 3, 8, 6, 14, 28, 32
2 | 3, 4, 3, 7, 14, 16
2 | 3, 2, 3, 7, 7, 8
3 | 3, 1, 3, 7, 7, 4
7 | 1, 1, 1, 7, 7, 4
1, 1, 1, 1, 1, 4

∴ L. C. M. is 8 × 3 × 7 × 4, or, 672.

IV.

(1)
31
47
217
124
1457

(2) 7403006) 13577113004 (1834
7403006
61741070
59224048
25170220
22209018
29612024
29612024

(3) 19 is the only factor common to the three products, and is therefore the H. C. F.

(4) 19 being the only factor common to the three products, the L. C. M. is 13 × 17 × 21 × 19.

(5) 875) 373625 (427
3500
2362
1750
6125
6125

and 875 + 427 = 1302.

V.

```
(1)  80514603 ) 1046689839 ( 13
                80514603
                ---------
                241543809
                241543809
                ---------
```

```
(2)    359         359         237          85083
       237         856         856         307304
      -----       -----       -----        202872
      2513        2154        1422        -------
     1077        1795        1185          595259
     718        2872        1896
     ------     ------      ------
     85083      307304      202872
```

```
(3) 1019527 ) 1231845 ( 1
              1019527
              -------
               212318 ) 1019527 ( 4
                         849272
                         -------
                          170255 ) 212318 ( 1
                                   170255
                                   ------
                                    42063 ) 170255 ( 4
                                            168252
                                            ------
                                              2003 ) 42063 ( 21
                                                     4006
                                                     -----
                                                      2003
                                                      2003
                                                     -----
```

∴ H. C. F. is 2003

```
(4)  2 | 12, 18, 26, 117, 312
       |---------------------
     2 |  6,  9, 13, 117, 156
       |---------------------
     3 |  3,  9, 13, 117,  78
       |---------------------
     3 |  1,  3, 13,  39,  26
       |---------------------
    13 |  1,  1, 13,  13,  26
       |---------------------
       |  1,  1,  1,   1,   2
```

∴ L. C. M. is 36 × 13 × 2, or, 936.

(5)

$$\begin{array}{r}
709514 \\
\underline{381569} \\
6385626 \\
4257084 \\
3547570 \\
709514 \\
5676112 \\
\underline{2128542} \\
270728547466
\end{array}$$

Two hundred and seventy thousand seven hundred and twenty-eight millions, five hundred and forty-seven thousand, four hundred and sixty-six.

VI.

(1) 25031007; one hundred and seventy-six millions, five hundred thousand three hundred and one.

(2)

$$\begin{array}{r}
905741 \\
\underline{518963} \\
2717223 \\
5434446 \\
8151669 \\
7245928 \\
905741 \\
\underline{4528705} \\
470046066583
\end{array}$$

Four hundred and seventy thousand and forty-six millions, sixty-six thousand five hundred and eighty-three.

(3)

$$\begin{array}{l}
743\,)\,42146675\,(\,56725 \\
\underline{3715} \\
4996 \\
\underline{4458} \\
5386 \\
\underline{5201} \\
1857 \\
\underline{1486} \\
3715 \\
\underline{3715}
\end{array}$$

(4)

Omitting 1, 3, 12 and 16.

$$\begin{array}{r|rrrrr}
2 & 5, & 9, & 14, & 96, & 128 \\ \hline
16 & 5, & 9, & 7, & 48, & 64 \\ \hline
3 & 5, & 9, & 7, & 3, & 4 \\ \hline
 & 5, & 3, & 7, & 1, & 4
\end{array}$$

∴ L. C. M. is 96 × 15 × 28, or, 40320.

(5) 42435) 195615 (4
169740

25875) 42435 (1
25875

16560) 25875 (1
16560

9315) 16560 (1
9315

7245) 9315 (1
7245

2070) 7245 (3
6210

1035) 2070 (2
2070

∴ H. C. F. is 1035.

VII.

(1) Three groups of ten units and four single units.

(2) 54321) 201096342 (3702
162963

381333
380247

108642
108642

(3)
3 | 964374
5 | 321458 and no units over.
11 | 64291 and 3 parcels of 3 units over.
| 5844 and 7 parcels of 15 units over.

∴ the remainder is 105 + 9, or, 114.

(4)

$$\begin{array}{r} 12 \\ 37 \\ \hline 84 \\ 36 \\ \hline 444 \end{array} \qquad\qquad \begin{array}{r} 444 \\ 59 \\ \hline 3996 \\ 2220 \\ \hline 26196 \end{array}$$

(5) $28 = 2 \times 14 = 2 \times 2 \times 7$

$45 = 5 \times 9 = 5 \times 3 \times 3$

$135 = 5 \times 27 = 5 \times 3 \times 3 \times 3$

$243 = 3 \times 81 = 3 \times 27 = 3 \times 3 \times 3 \times 3 \times 3.$

VIII.

(1)

$$\begin{array}{r|r} & 303066099 \\ & 33060660990 \\ \hline 3 & 33363727089 \\ \hline 11 & 11121242363 \\ \hline & 1011022033 \end{array}$$

One thousand and eleven millions twenty-two thousand and thirty-three.

(2)

$$\begin{array}{r|r l} 11 & 830728 & \\ \hline 3 & 75520 & \text{and 8 units over.} \\ \hline 7 & 25173 & \text{and 1 parcel of 11 units over.} \\ \hline & 3596 & \text{and 1 parcel of 33 units over.} \end{array}$$

∴ Remainder is $8 + 11 + 33 = 52$.

(3)

$$\begin{array}{r} 375 \\ 250 \\ \hline 18750 \\ 750 \\ \hline 93750 \end{array} \qquad\qquad \begin{array}{r} 93750 \\ 14000 \\ \hline 375000000 \\ 93750 \\ \hline 1312500000 \end{array}$$

(4) $87 = 3 \times 29$

$176 = 2 \times 88 = 2 \times 2 \times 44 = 2 \times 2 \times 2 \times 2 \times 11$

$576 = 2 \times 288 = 2 \times 2 \times 144 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3.$

(5) 504) 5292 (1
504
———
252) 504 (2
504
———

∴ The H. C. F. is 4.

252) 3040 (12
252
———
520
504
———
16) 252 (15
16
———
92
80
———
12) 16 (1
12
———
4) 12 (3
12
———

IX.

(1)

$$\begin{array}{r|l} & 8666066066 \\ & 2202002002 \\ \hline 8 & 6464064064 \\ \hline 8 & 808008008 \\ \hline & 101001001 \end{array}$$

One hundred and one millions, one thousand and one.

(2) 369) 2738 (7
2583
———
155

(3) 6258) 1270374 (203
12516
———
18774
18774
———

(4) 7.....2
999999
———
6.....3

for, whatever the digits may be in the vacant places, we must always carry on 1 from each step.

(5)
$$\begin{array}{r|l} 2 & 552,\ 575,\ 920 \\ \hline 4 & 276,\ 575,\ 460 \\ \hline 5 & 69,\ 575,\ 115 \\ \hline 5 & 69,\ 115,\ 115 \\ \hline 23 & 69,\ 23,\ 23 \\ \hline & 3,\ 1,\ 1 \end{array}$$

∴ L. C. M. is $200 \times 23 \times 3$, or, 13800

Ex. (xxvii), p. 47.

(1) $\frac{24}{80} = \frac{3\times8}{10\times8} = \frac{3}{10}$ (2) $\frac{72}{280} = \frac{9\times8}{35\times8} = \frac{9}{35}$

(3) $\frac{42}{210} = \frac{1\times42}{5\times42} = \frac{1}{5}$ (4) $\frac{192}{576} = \frac{1\times192}{3\times192} = \frac{1}{3}$

(5) $\frac{5184}{6912} = \frac{576}{768} = \frac{192}{256} = \frac{24}{32} = \frac{3}{4}$

(6) $\frac{1680}{1920} = \frac{168}{192} = \frac{56}{64} = \frac{7}{8}$

(7) $\frac{6409}{7395} = \frac{13\times493}{15\times493} = \frac{13}{15}$

(8) $\frac{319}{5687} = \frac{11\times29}{11\times517} = \frac{29}{517}$

(9) $\frac{9495}{15615} = \frac{1899}{3123} = \frac{211}{347}$

(10) $\frac{3178}{5221} = \frac{14\times227}{23\times227} = \frac{14}{23}$

Ex. (xxviii), p. 48.

(1) $\frac{3}{4} = \frac{3\times7}{4\times7} = \frac{21}{28}$ (2) $\frac{4}{9} = \frac{4\times6}{9\times6} = \frac{24}{54}$

$\frac{5}{7} = \frac{5\times4}{7\times4} = \frac{20}{28}$ $\frac{5}{18} = \frac{5\times3}{18\times3} = \frac{15}{54}$

$\frac{7}{27} = \frac{7\times2}{27\times2} = \frac{14}{54}$

(3) $\frac{3}{5} = \frac{3\times77}{5\times77} = \frac{231}{385}$

$\frac{4}{7} = \frac{4\times55}{7\times55} = \frac{220}{385}$

$\frac{6}{11} = \frac{6\times35}{11\times35} = \frac{210}{385}$

(4) $\frac{5}{12} = \frac{5\times20}{12\times20} = \frac{100}{240}$

$\frac{13}{20} = \frac{13\times12}{20\times12} = \frac{156}{240}$

$\frac{17}{80} = \frac{17\times3}{80\times3} = \frac{51}{240}$

$\frac{19}{120} = \frac{19\times2}{120\times2} = \frac{38}{240}$

(5) $\frac{4}{7} = \frac{4\times102}{7\times102} = \frac{408}{714}$

$\frac{15}{17} = \frac{15\times42}{17\times42} = \frac{630}{714}$

$\frac{26}{51} = \frac{26\times14}{51\times14} = \frac{364}{714}$

$\frac{65}{102} = \frac{65\times7}{102\times7} = \frac{455}{714}$

(6) $\frac{1}{3} = \frac{1\times30}{3\times30} = \frac{30}{90}$

$\frac{3}{5} = \frac{3\times18}{5\times18} = \frac{54}{90}$

$\frac{1}{6} = \frac{1\times15}{6\times15} = \frac{15}{90}$

$\frac{5}{18} = \frac{5\times5}{18\times5} = \frac{25}{90}$

(7) $\frac{3}{10} = \frac{3\times108}{10\times108} = \frac{324}{1080}$

$\frac{5}{27} = \frac{5\times40}{27\times40} = \frac{200}{1080}$

$\frac{7}{90} = \frac{7\times12}{90\times12} = \frac{84}{1080}$

$\frac{11}{360} = \frac{11\times3}{360\times3} = \frac{33}{1080}$

Ex. (xxix), p. 49.

(1) $\frac{3}{7} = \frac{3\times65}{7\times65} = \frac{195}{455}$

$\frac{4}{5} = \frac{4\times91}{5\times91} = \frac{364}{455}$

$\frac{9}{13} = \frac{9\times35}{13\times35} = \frac{315}{455}$

(2) $\frac{5}{6} = \frac{5\times51}{6\times51} = \frac{255}{306}$

$\frac{7}{9} = \frac{7\times34}{9\times34} = \frac{238}{306}$

$\frac{12}{17} = \frac{12\times18}{17\times18} = \frac{216}{306}$

(3) $\frac{9}{11} = \frac{9\times105}{11\times105} = \frac{945}{1155}$

$\frac{13}{15} = \frac{13\times77}{15\times77} = \frac{1001}{1155}$

$\frac{17}{21} = \frac{17\times55}{21\times55} = \frac{935}{1155}$

(4) $\frac{3}{20} = \frac{3\times14}{20\times14} = \frac{42}{280}$

$\frac{7}{40} = \frac{7\times7}{40\times7} = \frac{49}{280}$

$\frac{11}{70} = \frac{11\times4}{70\times4} = \frac{44}{280}$

(5) $\frac{7}{33} = \frac{7\times99}{33\times99} = \frac{693}{3267}$

$\frac{9}{43} = \frac{9\times77}{43\times77} = \frac{693}{3311}$

$\frac{11}{53} = \frac{11\times63}{53\times63} = \frac{693}{3339}$

(6) $\frac{2}{17} = \frac{2\times6}{17\times6} = \frac{12}{102}$

$\frac{5}{34} = \frac{5\times3}{34\times3} = \frac{15}{102}$

$\frac{7}{51} = \frac{7\times2}{51\times2} = \frac{14}{102}$

Ex. (xxx), p. 50.

(1) $\frac{1}{7} + \frac{2}{5} = \frac{5}{35} + \frac{14}{35} = \frac{19}{35}$

(2) $\frac{2}{3} + \frac{3}{14} = \frac{28}{42} + \frac{9}{42} = \frac{37}{42}$

(3) $\frac{2}{7} + \frac{3}{11} + \frac{2}{33} = \frac{66}{231} + \frac{63}{231} + \frac{14}{231} = \frac{143}{231} = \frac{13}{21}$

(4) $\frac{4}{9} + \frac{5}{14} + \frac{5}{42} = \frac{56}{126} + \frac{45}{126} + \frac{15}{126} = \frac{116}{126} = \frac{58}{63}$

(5) $\frac{5}{13} + \frac{2}{39} + \frac{25}{78} + \frac{7}{156} = \frac{60}{156} + \frac{8}{156} + \frac{50}{156} + \frac{7}{156}$
$= \frac{125}{156}$

(6) $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \frac{1}{32} = \frac{16+8+4+2+1}{32} = \frac{31}{32}$

(7) $\frac{5}{11} + \frac{2}{27} + \frac{7}{55} + \frac{4}{135} = \frac{675+110+189+44}{1485} = \frac{1018}{1485}$

(8) $\frac{1}{3} + \frac{1}{5} + \frac{1}{7} + \frac{1}{9} + \frac{1}{11} = \frac{1155+693+495+385+315}{3465}$
$= \frac{3043}{3465}$

(9) $\frac{2}{3} + \frac{3}{40} + \frac{7}{240} + \frac{11}{2880} = \frac{1920+216+84+11}{2880} = \frac{2231}{2880}$

Ex. (xxxi), p. 51.

(1) $\frac{5}{6}-\frac{4}{5}=\frac{25}{30}-\frac{24}{30}=\frac{1}{30}$

(2) $\frac{15}{19}-\frac{3}{7}=\frac{105}{133}-\frac{57}{133}=\frac{48}{133}$

(3) $\frac{12}{13}-\frac{11}{12}=\frac{144}{156}-\frac{143}{156}=\frac{1}{156}$

(4) $\frac{235}{357}-\frac{13}{51}=\frac{235}{357}-\frac{91}{357}=\frac{144}{357}=\frac{48}{119}$

(5) $\frac{17}{63}-\frac{29}{108}=\frac{204}{756}-\frac{203}{756}=\frac{1}{756}$

(6) $\frac{9}{38}-\frac{43}{209}=\frac{99}{418}-\frac{86}{418}=\frac{13}{418}$

(7) $\frac{146}{273}-\frac{268}{637}=\frac{1022}{1911}-\frac{804}{1911}=\frac{218}{1911}$

(8) $\frac{359}{360}-\frac{199}{200}=\frac{1795}{1800}-\frac{1791}{1800}=\frac{4}{1800}=\frac{1}{450}$

(9) $\frac{835}{1998}-\frac{347}{1242}=\frac{19205}{45954}-\frac{12839}{45954}=\frac{6366}{45954}=\frac{1061}{7659}$

Ex. (xxxii), p. 53.

(1) $\frac{3}{7}\times\frac{5}{9}=\frac{3\times5}{7\times3\times3}=\frac{5}{21}$

(2) $\frac{3\times5\times9}{4\times7\times11}=\frac{15\times9}{28\times11}=\frac{135}{308}$

(3) $\frac{42\times39\times24}{65\times56\times27}=\frac{2\times3\times7\times3\times13\times3\times8}{5\times13\times8\times7\times3\times3\times3}=\frac{2}{5}$

(4) $\frac{84\times102\times91}{85\times117\times132}=\frac{7\times12\times17\times6\times13\times7}{5\times17\times13\times9\times11\times12}=\frac{98}{165}$

(5) $\frac{17\times27\times123}{82\times38\times153}=\frac{17\times9\times3\times41\times3}{2\times41\times38\times17\times9}=\frac{9}{76}$

(6) $\frac{100\times35\times33}{161\times72\times40}=\frac{2\times5\times10\times7\times5\times3\times11}{7\times23\times2\times3\times12\times10\times4}$

$=\frac{5\times5\times11}{23\times12\times4}=\frac{275}{1104}.$

(7) $\frac{9\times11\times13\times21}{10\times12\times14\times29}=\frac{9\times11\times13\times7\times3}{10\times3\times4\times7\times2\times29}$

$=\frac{9\times11\times13}{10\times4\times2\times29}=\frac{1287}{2320}$

(8) $\frac{292\times573\times248}{465\times657\times1719}=\frac{4\times73\times3\times191\times8\times31}{31\times15\times73\times9\times9\times191}$

$=\frac{4\times8}{5\times9\times9}=\frac{32}{405}$

(9) $\frac{1205\times712\times1535}{2763\times2169\times1068}=\frac{5\times241\times8\times89\times5\times307}{307\times9\times241\times9\times89\times12}$

$=\frac{5\times8\times5}{9\times9\times12}=\frac{50}{243}$

Ex. (xxxiii), p. 54.

(1) $\frac{12}{49}\div\frac{3}{7}=\frac{12}{49}\times\frac{7}{3}=\frac{3\times4\times7}{7\times7\times3}=\frac{4}{7}$

(2) $\frac{25}{39}\div\frac{10}{13}=\frac{25}{39}\times\frac{13}{10}=\frac{5\times5\times13}{3\times13\times2\times5}=\frac{5}{6}$

(3) $\frac{85}{256}\div\frac{51}{64}=\frac{85}{256}\times\frac{64}{51}=\frac{5\times17\times64}{4\times64\times3\times17}=\frac{5}{12}$

(4) $\frac{16}{261}\div\frac{4}{27}=\frac{16\times27}{261\times4}=\frac{4\times4\times3\times9}{29\times9\times4}=\frac{12}{29}$

(5) $\frac{38}{275}\div\frac{133}{385}=\frac{38\times385}{275\times133}=\frac{2\times19\times11\times35}{11\times25\times7\times19}=\frac{2}{5}$

(6) $\frac{91}{369}\div\frac{78}{287}=\frac{91\times287}{369\times78}=\frac{13\times7\times41\times7}{9\times41\times6\times13}=\frac{49}{54}$

(7) $\frac{49}{550}\div\frac{343}{1450}=\frac{49\times1450}{550\times343}=\frac{49\times50\times29}{50\times11\times7\times49}=\frac{29}{77}$

(8) $\frac{695}{1544}\div\frac{1251}{2316}=\frac{695\times2316}{1544\times1251}$

$=\frac{5\times139\times4\times579}{8\times193\times9\times139}=\frac{5}{6}$

(9) $\frac{1535}{2421} \div \frac{921}{1076} = \frac{1535 \times 1076}{2421 \times 921}$

$= \frac{5 \times 307 \times 4 \times 269}{9 \times 269 \times 3 \times 307} = \frac{20}{27}$

Ex. (xxxiv), p. 56.

(1) $7\frac{4}{9} = \frac{63+4}{9} = \frac{67}{9}$ (2) $23\frac{15}{47} = \frac{1081+15}{47} = \frac{1096}{47}$

(3) $216\frac{13}{29} = \frac{6264+13}{29} = \frac{6277}{29}$

(4) $173\frac{19}{1000} = \frac{173000+19}{1000} = \frac{173019}{1000}$

(5) $\frac{427}{10} = \frac{420+7}{10} = 42\frac{7}{10}$

(6) $\frac{3477}{1000} = \frac{3000+477}{1000} = 3\frac{477}{1000}$

(7) $\frac{4293}{137} = \frac{4247+46}{137} = 31\frac{46}{137}$

(8) $\frac{65943}{71} = \frac{65888+55}{71} = 928\frac{55}{71}$

Ex. (xxxv), p. 58.

(1) $4\frac{2}{7} \div 3\frac{7}{9} = \frac{30}{7} \times \frac{9}{34} = \frac{2 \times 15 \times 9}{7 \times 2 \times 17} = \frac{135}{119} = 1\frac{16}{119}$

(2) $8\frac{3}{5} \div 6\frac{1}{7} = \frac{43}{5} \times \frac{7}{43} = \frac{7}{5} = 1\frac{2}{5}$

(3) $104\frac{2}{9} \div 53\frac{7}{13} = \frac{938}{9} \times \frac{13}{696} = \frac{2 \times 469 \times 13}{9 \times 2 \times 348} = \frac{6097}{3132} = 1\frac{2965}{3132}$

(4) $6\frac{2}{3} \times 9\frac{5}{6} = \frac{20 \times 59}{3 \times 6} = \frac{590}{9} = 65\frac{5}{9}$

(5) $14 \times 3\frac{2}{21} = \frac{14 \times 65}{21} = \frac{130}{3} = 43\frac{1}{3}$

(6) $9\frac{4}{15} \times 19\frac{2}{7} = \frac{139 \times 135}{15 \times 7} = \frac{139 \times 9}{7} = \frac{1251}{7} = 178\frac{5}{7}$

(7) $2\frac{1}{3} + 3\frac{1}{4} = 5 + \frac{1}{3} + \frac{1}{4} = 5\frac{7}{12}$

(8) $5\frac{2}{7} + 6\frac{3}{11} + 1\frac{4}{15} = 12 + \frac{330+315+308}{1155} = 12\frac{953}{1155}$

(9) $16\frac{2}{5} + 4\frac{4}{9} + 17\frac{13}{45} = 37 + \frac{18+20+13}{45} = 37 + \frac{51}{45} = 38\frac{2}{15}$

(10) $4\frac{3}{7} - 2\frac{1}{5} = 2 + \frac{3}{7} - \frac{1}{5} = 2\frac{8}{35}$

(11) $14\frac{4}{9} - 5\frac{7}{8} = 8 + \frac{8}{8} + \frac{4}{9} - \frac{7}{8} = 8 + \frac{1}{8} + \frac{4}{9} = 8\frac{41}{72}$

(12) $6\frac{7}{13} - 5\frac{9}{14} = \frac{14}{14} + \frac{7}{13} - \frac{9}{14} = \frac{5}{14} + \frac{7}{13} = \frac{65+98}{182} = \frac{163}{182}$

Ex. (xxxvi), p. 59.

(1) $\frac{3}{4}$ of $\frac{46}{9}$ of $\frac{36}{5} = \frac{3\times46\times36}{4\times9\times5} = \frac{138}{5} = 27\frac{3}{5}$

(2) $\frac{31}{7}$ of $\frac{56}{5}$ of $15 = \frac{31\times56\times15}{7\times5} = 31 \times 8 \times 3 = 744$

(3) $\frac{7}{8}$ of $\frac{23}{9}$ of $\frac{25}{7}$ of $90 = \frac{7\times23\times25\times90}{8\times9\times7} = \frac{23\times25\times10}{8} = 718\frac{3}{4}$

(4) $\frac{2}{5} \div \frac{7}{8} = \frac{2}{5} \times \frac{8}{7} = \frac{16}{35}$

(5) $6\frac{2}{9} \div 4\frac{2}{3} = \frac{56}{9} \times \frac{3}{14} = \frac{4}{3} = 1\frac{1}{3}$

(6) $14 \div 3\frac{1}{2} = \frac{14}{1} \times \frac{2}{7} = 4$

(7) $30\frac{1}{4} \div 11 = \frac{121}{4} \times \frac{1}{11} = \frac{11}{4} = 2\frac{3}{4}$

(8) $16\frac{2}{3} \div \frac{25}{39} = \frac{50}{3} \times \frac{39}{25} = 2 \times 13 = 26$

Ex. (xxxvii), p. 62.

(1) $\dfrac{6}{5 + \frac{3}{4}} = \frac{24}{20+3} = \frac{24}{23} = 1\frac{1}{23}$

(2) $\dfrac{7}{19 - \frac{3}{11}} = \frac{77}{209-3} = \frac{77}{206}$

(3) $\dfrac{\frac{4}{5}}{7 - \frac{2}{3}} = \frac{12}{105-10} = \frac{12}{95}$

(4) $\dfrac{6\frac{7}{8}}{11 - \frac{5}{12}} = \dfrac{\frac{55}{8}}{11 - \frac{5}{12}} = \frac{165}{264-10} = \frac{165}{254}$

(5) $\dfrac{\frac{4}{5} - \frac{3}{20}}{\frac{7}{10} - \frac{9}{40}} = \frac{32-6}{28-9} = \frac{26}{19} = 1\frac{7}{19}$

(6) $$\frac{\frac{11}{16}-\frac{5}{24}}{\frac{7}{12}+\frac{3}{4}}=\frac{33-10}{28+36}=\frac{23}{64}$$

(7) $$\frac{2}{5+\dfrac{6}{9+\frac{3}{4}}}=\frac{2}{5+\frac{24}{39}}=\frac{78}{195+24}=\frac{78}{219}=\frac{26}{73}$$

(8) $$\frac{3}{2+\dfrac{1}{3+\frac{1}{3}}}=\frac{3}{2+\frac{3}{10}}=\frac{30}{20+3}=\frac{30}{23}=1\tfrac{7}{23}$$

(9) $$\frac{5}{2-\dfrac{1}{4-\frac{2}{5}}}=\frac{5}{2-\frac{5}{18}}=\frac{90}{31}=2\tfrac{28}{31}$$

(10) $$\frac{1}{1+\dfrac{1}{1+\dfrac{1}{1+\frac{2}{5}}}}=\frac{1}{1+\dfrac{1}{1+\frac{5}{7}}}=\frac{1}{1+\frac{7}{12}}=\frac{12}{19}$$

Ex. (xxxviii), p. 63.

(1) $$3\tfrac{2}{5}\div\left(2\tfrac{1}{3}+1\tfrac{5}{7}\right)=3\tfrac{2}{5}\div\tfrac{85}{21}=\frac{17\times21}{5\times85}=\frac{21}{25}$$

(2) $$\left(4\tfrac{3}{11}+2\tfrac{1}{5}\right)\div35\tfrac{3}{5}=\tfrac{356}{55}\div35\tfrac{3}{5}=\frac{356\times5}{55\times178}=\frac{2}{11}$$

(3) $$\frac{2}{1+\dfrac{5}{7+\frac{2}{3}}}=\frac{2}{1+\frac{15}{23}}=\frac{46}{38}=1\tfrac{4}{19}$$

(4) $$\frac{1}{1+\dfrac{1}{1+\frac{1}{2}}}=\frac{1}{1+\frac{2}{3}}=\frac{3}{5}$$

(5) $$5+\frac{3}{4-\dfrac{5}{7+\frac{2}{5}}}=5+\frac{3}{4-\frac{25}{37}}=5+\frac{111}{123}=5\tfrac{37}{41}$$

(6) $$\tfrac{3}{7}+\tfrac{5}{9}\text{ of }\tfrac{3}{10}-\tfrac{2}{21}=\tfrac{3}{7}+\tfrac{1}{6}-\tfrac{2}{21}=\frac{18+7-4}{42}=\frac{1}{2}$$

(7) $$\tfrac{2}{3}\text{ of }\tfrac{5}{9}+\tfrac{3}{7}\div\tfrac{4}{5}=\tfrac{10}{27}+\tfrac{15}{28}=\frac{280+405}{756}=\frac{685}{756}$$

(8) $(\frac{11}{13} \div \frac{2}{7})$ of $7\frac{7}{12} - 1\frac{3}{5} = \frac{77}{26} \times \frac{91}{12} - \frac{8}{5} = \frac{539}{24} - \frac{8}{5} = \frac{2503}{120} = 20\frac{103}{120}$

(9) $(\frac{4}{9} - \frac{3}{11})(\frac{11}{4} + \frac{11}{3}) = \frac{17}{9 \times 11} \times \frac{77}{12} = \frac{119}{108} = 1\frac{11}{108}$

(10) $(\frac{3}{13} - \frac{2}{39}) \div (\frac{5}{78} + \frac{7}{156}) = \frac{7}{39} \div \frac{17}{156} = \frac{7 \times 156}{39 \times 17} = \frac{28}{17} = 1\frac{11}{17}$

(11) $\dfrac{(2 + \frac{1}{5}) \div (3 + \frac{1}{7})}{(\frac{1}{2} - \frac{1}{3}) \times (4 - 3\frac{3}{7})} = \dfrac{\frac{11}{5} \times \frac{7}{22}}{\frac{1}{6} \times \frac{4}{7}} = \dfrac{\frac{7}{10}}{\frac{2}{21}} = \frac{147}{20} = 7\frac{7}{20}$

(12) $\dfrac{(3\frac{1}{3} - 2\frac{1}{2}) \div \frac{5}{6} \text{ of } \frac{3}{8}}{2\frac{2}{3} \div (\frac{1}{2} + \frac{1}{4})} = \dfrac{\frac{5}{6} \div \frac{5}{16}}{\frac{8}{3} \div \frac{3}{4}} = \dfrac{\frac{16}{6}}{\frac{32}{9}} = \frac{16 \times 9}{6 \times 32} = \frac{3}{4}$

Ex. (xxxix), p. 63.

(1) $\frac{17}{33} + \frac{5}{12} + \frac{8}{44} + \frac{3}{28} + \frac{15}{56} = \frac{952+770+336+198+495}{1848}$

$= \frac{2751}{1848} = \frac{917}{616} = \frac{131}{88} = 1\frac{43}{88}$

(2) $\frac{2}{5}$ of $\frac{3}{7} + \frac{3}{7}$ of $2\frac{1}{3} = \frac{6}{35} + 1 = 1\frac{6}{35}$

$(\frac{2}{3}$ of $\frac{5}{6}) \div (\frac{5}{4} + \frac{4}{5}) = \frac{5}{9} \div \frac{41}{20} = \frac{5 \times 20}{9 \times 41}$

$\frac{41}{35} \times \frac{5 \times 20}{9 \times 41} = \frac{20}{63}$

(3) $1\frac{1}{2}$ of $\frac{4}{9} - \frac{2}{3}$ of $\frac{5}{6} = \frac{2}{3} - \frac{5}{9} = \frac{3}{27} = \frac{1}{9}$

$(\frac{2}{3} - \frac{4}{7}) \times (\frac{4}{5} - \frac{5}{8}) = \frac{2}{21} \times \frac{7}{40} = \frac{1}{60}$

$\frac{1}{9} \div \frac{1}{60} = \frac{60}{9} = 6\frac{2}{3}$

(4) $\frac{221}{629} = \frac{13 \times 17}{37 \times 17} = \frac{13}{37}$

$\frac{72816}{8528} = \frac{18204}{2132} = \frac{4551}{533} = \frac{111 \times 41}{13 + 41} = \frac{111}{13}$

$\frac{13}{37} \times \frac{111}{13} = 3$

(5) $(3\frac{2}{5} \times 3\frac{3}{7}) \div (1\frac{5}{7} \times 1\frac{13}{21}) = (\frac{17}{5} \times \frac{24}{7}) \div (\frac{12}{7} \times \frac{34}{21})$

$= \frac{17 \times 24 \times 7 \times 21}{5 \times 7 \times 12 \times 34} = \frac{21}{5} = 4\frac{1}{5}$

(6) $(4\frac{1}{3} \times 2\frac{3}{4}) + 4\frac{3}{4} + 3\frac{1}{3} = \frac{143}{12} + 4\frac{3}{4} + 3\frac{1}{3}$

$= 18 + \frac{11}{12} + \frac{9}{12} + \frac{4}{12} = 18 + \frac{24}{12} = 20$

(7) $\frac{21}{71} - \frac{201}{701} = \frac{14721 - 14271}{71 \times 701} = \frac{450}{71 \times 701}$

$4\frac{7}{15} + 1\frac{3}{8} = \frac{67}{15} + \frac{11}{8} = \frac{536 + 165}{15 \times 8} = \frac{701}{15 \times 8}$

$\frac{450}{71 \times 701} \times \frac{701}{15 \times 8} = \frac{30}{71 \times 8} = \frac{15}{284}$

$\frac{15}{284} \times (10\frac{2}{5} - 5\frac{2}{3}) = \frac{15}{284} \times \frac{71}{15} = \frac{1}{4}$

(8) $(\frac{1}{3} + \frac{4}{7}) \times \frac{20\frac{1}{4}}{3\frac{6}{7} + 2\frac{1}{4}} = \frac{19}{21} \times \frac{567}{108 + 63} = \frac{19 \times 567}{21 \times 171} = 3$

(9) $(3\frac{4}{5} + 5\frac{1}{9} - \frac{1}{45})(4\frac{1}{5} - 3\frac{1}{4}) = 8\frac{40}{45} \times \frac{19}{20} = \frac{80}{9} \times \frac{19}{20} = \frac{4 \times 19}{9}$

$1\frac{5}{11} + 2\frac{1}{8} - (2\frac{9}{16} - \frac{1}{8} - \frac{1}{22}) = 3\frac{51}{88} - 2\frac{69}{176} = 1\frac{33}{176} = \frac{19}{16}$

$\frac{4 \times 19}{9} \div \frac{19}{16} = \frac{4 \times 19 \times 16}{9 \times 19} = \frac{64}{9} = 7\frac{1}{9}$

(10) $(1\frac{1}{3} + 2\frac{2}{7})\left(\frac{5\frac{1}{16}}{4\frac{6}{7} + 1\frac{1}{4}}\right) = 3\frac{13}{21} \times \frac{567}{544 + 140} = \frac{76 \times 567}{21 \times 684} = 3$

(11) $(7\frac{1}{9} + 1\frac{4}{5} - \frac{1}{45})(2\frac{1}{4} - \frac{4}{5}) = 8\frac{40}{45} \times \frac{29}{20} = \frac{80}{9} \times \frac{29}{20} = \frac{4 \times 29}{9}$

$4\frac{1}{8} - \frac{6}{11} - (2\frac{7}{8} - \frac{7}{16} - \frac{1}{22}) = 3\frac{51}{88} - 2\frac{69}{176} = 1\frac{33}{176} = \frac{19}{16}$

$\frac{4 \times 29}{9} \div \frac{19}{16} = \frac{4 \times 29 \times 16}{9 \times 19} = \frac{1856}{171} = 10\frac{146}{171}$

(12) $\frac{6\frac{3}{4} - 1\frac{5}{14}}{2\frac{1}{6} + 1\frac{3}{7}} = \frac{5\frac{11}{28}}{3\frac{25}{42}} = \frac{151 \times 42}{151 \times 28} = \frac{3}{2} = 1\frac{1}{2}$

$(\frac{5}{7} \text{ of } 1\frac{6}{13}) \div \frac{2\frac{5}{7}}{3\frac{1}{4}} = \frac{5 \times 19}{7 \times 13} \div \frac{19 \times 4}{13 \times 7} = \frac{5 \times 19 \times 13 \times 7}{7 \times 13 \times 19 \times 4} = 1\frac{1}{4}$

(18) $\cfrac{1}{4 - \cfrac{1}{2 - \cfrac{1}{1 - \frac{5}{13}}}} = \cfrac{1}{4 - \cfrac{1}{2 - \frac{13}{8}}} = \cfrac{1}{4 - \frac{8}{3}} = \frac{3}{4}$

$\cfrac{1}{4 + \cfrac{1}{1 - \cfrac{1}{2 - \frac{9}{16}}}} = \cfrac{1}{4 + \cfrac{1}{1 - \frac{16}{23}}} = \cfrac{1}{4 + \frac{23}{7}} = \frac{7}{51}.$

(14) $$\frac{10\frac{2}{5} - 1\frac{5}{7}}{7\frac{1}{8} + 3\frac{3}{40}} = \frac{8\frac{24}{35}}{10\frac{1}{5}} = \frac{304 \times 5}{51 \times 35} = \frac{304}{357}$$

$$\left(\tfrac{3}{7} \text{ of } 2\tfrac{1}{17}\right) \div \frac{1\frac{2}{3}}{2\frac{3}{7}} = \frac{3 \times 35}{7 \times 17} \div \frac{5 \times 7}{3 \times 17} = \frac{3 \times 35 \times 3 \times 17}{7 \times 17 \times 5 \times 7} = 1\tfrac{2}{7}$$

(15) $$\frac{8\frac{7}{8} - 7\frac{6}{7} + 5\frac{5}{6} - 4\frac{4}{5}}{9\frac{9}{10} - 8\frac{13}{15} + 7\frac{7}{8} - 6\frac{6}{7}} = \frac{1\frac{1}{56} + 1\frac{1}{30}}{1\frac{1}{30} + 1\frac{1}{56}} = 1$$

$$1\tfrac{21}{43} \times \tfrac{37797}{75008} = \tfrac{64 \times 37797}{43 \times 75008} = \tfrac{879}{1172} = \tfrac{3 \times 293}{4 \times 293} = \tfrac{3}{4}$$

(16) $$\frac{5 - \cfrac{1}{5 - \frac{1}{5}}}{3 - \cfrac{1}{3 - \frac{1}{3}}} \times \frac{9}{23} \times 7 = \frac{5 - \frac{5}{24}}{3 - \frac{3}{8}} \times \frac{9}{23} \times 7 = \frac{115 \times 9 \times 7}{63 \times 23} = 5$$

$$\frac{6 + \cfrac{1}{6 - \frac{1}{6}}}{4 - \cfrac{1}{4 - \frac{1}{4}}} \times 10\tfrac{8}{9} = \frac{6 + \frac{6}{35}}{4 - \frac{4}{15}} \times \frac{98}{9} = \frac{648 \times 98}{392 \times 9} = 18$$

(17) $$\frac{8\frac{3}{5} - 7\frac{3}{4} + 5\frac{2}{3} - 4\frac{1}{2}}{13 - 11\frac{9}{10} + 10\frac{7}{9} - 9\frac{17}{20}} = \frac{2 + \frac{3}{5} + \frac{2}{3} - \frac{3}{4} - \frac{1}{2}}{3 + \frac{7}{9} - \frac{9}{10} - \frac{17}{20}}$$

$$= \frac{\frac{3}{5} + \frac{2}{3} + \frac{1}{4} + \frac{1}{2}}{1 + \frac{7}{9} + \frac{1}{10} + \frac{3}{20}} = \frac{\frac{121}{60}}{\frac{365}{180}} = \frac{121 \times 3}{365}$$

$$\tfrac{121 \times 3}{365} \times \tfrac{2}{11} \text{ of } 365 = 11 \times 3 \times 2 = 66$$

(18) $$\frac{\frac{1}{21} \times \frac{132}{23} \times \frac{69}{11} + \frac{325}{51} \times \frac{72}{49} \times \frac{17}{39} + \frac{59}{49}}{\frac{529}{57} \times \frac{45}{23} \times \frac{38}{207} + \frac{245}{78} \times \frac{143}{21} \times \frac{32}{245}} \times \frac{112}{9}$$

$$= \frac{\frac{12}{7} + \frac{200}{49} + \frac{59}{49}}{\frac{10}{3} + \frac{176}{63}} \times \frac{112}{9} = \frac{\frac{343}{49}}{\frac{386}{63}} \times \frac{112}{9}$$

$$= \frac{7 \times 112 \times 63}{386 \times 9} = \frac{2744}{193} = 14\tfrac{42}{193}$$

(19) $$\frac{\frac{1}{23} \times \frac{115}{17} \times \frac{323}{13} - \frac{85}{18} \times \frac{135}{34} \times \frac{96}{325}}{\frac{160}{19} \times \frac{209}{39} \times \frac{32}{143} - \frac{150}{20} \times \frac{336}{65} \times \frac{25}{371}} \times \frac{100}{23}$$

$$= \frac{\frac{5 \times 19}{13} - \frac{3 \times 24}{13}}{\frac{32}{3} - \frac{36}{13}} \times \frac{100}{23} = \frac{\frac{23}{13}}{\frac{308}{39}} \times \frac{100}{23} = \frac{3 \times 100}{308} = \frac{75}{77}$$

(20)
$$\frac{19}{7 \times \dfrac{2}{3 - 1\frac{2}{3}}} \times \tfrac{7735}{67184} \div \left(\tfrac{19}{16} - \tfrac{47}{48}\right)$$

$$= \frac{19}{7 \times \frac{6}{4}} \times \tfrac{7735}{67184} \div \tfrac{10}{48}$$

$$= \tfrac{19 \times 4 \times 7735 \times 48}{7 \times 6 \times 67184 \times 10} = \tfrac{2 \times 1105 \times 8}{3536 \times 5} = \tfrac{221}{221} = 1$$

(21)
$$\frac{1}{2 + \frac{18}{29}} \times \tfrac{4862}{4147} \div \left(\tfrac{3}{2} - \tfrac{23}{38}\right)$$

$$= \tfrac{29}{76} \times \tfrac{4862}{4147} \div \tfrac{34}{38}$$

$$= \tfrac{29 \times 4862 \times 38}{76 \times 4147 \times 34} = \tfrac{2431}{143 \times 34} = \tfrac{17}{34} = \tfrac{1}{2}$$

(22)
$$\frac{\dfrac{7}{4 - \frac{5}{6}} - \dfrac{5}{6 - \frac{3}{8}}}{\dfrac{4}{7 - \frac{4}{7}} + \dfrac{2}{4 - \frac{2}{5}}} \times \frac{\dfrac{1}{\frac{1}{2} - \frac{27}{59}} - 13}{19 - \dfrac{1}{\frac{1}{2} - \frac{6}{31}}}$$

$$= \frac{\frac{42}{19} - \frac{40}{45}}{\frac{28}{45} + \frac{10}{18}} \times \frac{\frac{118}{5} - 13}{19 - \frac{62}{19}}$$

$$= \frac{\frac{1130}{19 \times 45}}{\frac{106}{90}} \times \frac{\frac{53}{5}}{\frac{299}{19}}$$

$$= \tfrac{1130 \times 90 \times 53 \times 19}{19 \times 45 \times 106 \times 5 \times 299} = \tfrac{226 \times 2 \times 53}{106 \times 299} = \tfrac{226}{299}$$

(23)
$$\frac{\frac{10}{11} + \frac{18}{19}}{\frac{12}{7} - \frac{5}{11}} \times \frac{\frac{9}{4} - \frac{22}{14}}{\frac{56}{57} - \frac{110}{228}}$$

$$= \frac{\frac{388}{11 \times 19}}{\frac{97}{11 \times 7}} \times \frac{\frac{19}{28}}{\frac{114}{228}} = \tfrac{388 \times 7}{97 \times 19} \times \tfrac{19 \times 228}{28 \times 114}$$

$$= \tfrac{4 \times 7 \times 2}{28} = 2$$

Ex. (xl), p. 68.

(1) $\cdot 5 = \frac{5}{10} = \frac{1}{2}$ (2) $\cdot 25 = \frac{25}{100} = \frac{1}{4}$

(3) $\cdot 75 = \frac{75}{100} = \frac{3}{4}$ (4) $\cdot 375 = \frac{375}{1000} = \frac{3}{8}$

(5) $\cdot 00243 = \frac{243}{100000}$

(6) $\cdot 0000725 = \frac{725}{10000000} = \frac{29}{400000}$

(7) $14\cdot 8 = \frac{148}{10} = \frac{74}{5}$ (8) $104\cdot 235 = \frac{104235}{1000} = \frac{20847}{200}$

(9) $50\cdot 0004 = \frac{500004}{10000} = \frac{125001}{2500}$ (10) $100\cdot 001 = \frac{100001}{1000}$

(11) $\frac{9}{10} = \cdot 9$ (12) $\frac{37}{100} = \cdot 37$ (13) $\frac{4579}{10000} = \cdot 4579$

(14) $\frac{3}{1000} = \cdot 003$ (15) $\frac{17295}{100} = 172\cdot 95$

(16) $\frac{59}{10000000} = \cdot 0000059$ (17) $\frac{25679}{1000000} = \cdot 025679$

(18) $\frac{325793}{100000} = 3\cdot 25793$ (19) $\frac{19}{10000} = \cdot 0019$

Ex. (xli), p. 71.

(1)
$$\begin{array}{r@{\cdot}l} & 275 \\ & 425 \\ \hline & 700 \end{array}$$

(2)
$$\begin{array}{r@{\cdot}l} & 007 \\ & 2394 \\ \hline & 2464 \end{array}$$

(3)
$$\begin{array}{r@{\cdot}l} & 001 \\ & 0002 \\ \hline & 0012 \end{array}$$

(4)
$$\begin{array}{r@{\cdot}l} 13 & 279 \\ 3 & 00046 \\ 742 & 000372 \\ \hline 758 & 279832 \end{array}$$

(5)
$$\begin{array}{r@{\cdot}l} & 000493 \\ 3 & 24 \\ 15 & \\ 42 & 6 \\ 324 & 42037 \\ \hline 385 & 260863 \end{array}$$

(6)
$$\begin{array}{r@{\cdot}l} 49 & 327 \\ & 458 \\ 8317 & 05 \\ 341 & 875 \\ 32 & 4962 \\ \hline 8741 & 2062 \end{array}$$

(7)
$$\begin{array}{r@{\cdot}l} 700 & 372 \\ 894 & 0009 \\ & 347 \\ & 00082 \\ 5370 & 006 \\ \hline 6964 & 72672 \end{array}$$

(8)
$$\begin{array}{r@{\cdot}l} 560 & 379 \\ & 45687 \\ 350 & 0036 \\ 7 & 074 \\ 52 & 257 \\ \hline 970 & 17047 \end{array}$$

Ex. (xlii), p. 72.

(1)
56·429
5·218
51·211

(2)
9·005
7·462
1·543

(3)
53·3160
5·0867
48·2293

(4)
·800
·799
·001

(5)
6·0470
5·9863
·0607

(6)
850·0070
270·8796
579·1274

(7)
·0000100
·0000086
·0000014

(8)
·005370
·000985
·004385

(9)
10·0000
·0002
9·9998

(10)
·10100
·09999
·00101

Ex. (xliii), p. 74.

(1)
7·5
4·7
525
300
35·25

(2)
3·62
5·23
1086
724
1810
18·9326

(3)
·427
·235
2135
1281
854
·100345

(4)
·562
·00074
2248
3934
·00041588

(5)
3·00704
4·0205
1503520
601408
1202816
12·089804320

(6)
·0009
1000
·9000

(7)
623·4075
24·0259
56106675
31170375
12468150
24936300
12468150
14977·92625425

(8)
·00746
·006235
3730
2238
1492
4476
00004651310

```
(9)      1432·6749
      ·00004030705
      ------------
          71633745
        100287243
       429802470
      57306996
   ---------------
   ·057746898828045
```

```
(10)       50704·042
        ·004007090061
        -------------
            50704042
          304224252
        456336378
      354928294·
    202816168
   ------------------
   203·175662750726562
```

```
(11)   ·407
       4·03
       ----
       1221
      1628
     ------
    1·64021
       ·006
   --------
  ·00984126
```

```
(12)  1·01
      1000
   -------
   1010·00
    ·001
   -------
   1·010
```

```
(13)      ·52
         ·007
       ------
      ·00364
         4·3
       ------
        1092
       1456
      -------
     ·015652
         ·02
   ----------
   ·00031304
```

```
(14)  52·47
        4·6
     ------
      31482
     20988
    -------
    241·362
       ·07
   --------
   16·89534
      ·009
   --------
  ·15205806
```

```
(15)    42·6
        ·795
       -----
        2130
       3834
      2982
     -------
     33·8670
       4·03
     -------
      101601
     135468
   ---------
   136·48401
      ·00074
   ---------
    54593604
   95538807
  -----------
  ·1009981674
```

```
(16)   2·74
       2·74
       ----
       1096
      1918
      548
     ------
     7·5076
       2·74
     ------
     300304
    525532
   150152
  ---------
  20·570824
```

```
(17)   3·5
       3·5
      ----
       175
      105
     -----
     12·25
     12·25
     -----
      6125
     2450
    2450
   1225
  --------
  150·0625
```

Ex. (xliv), p. 78.

(1) 108) 1296 (12
108
216
216

(2) 12 | 172800
14400

(3) 13) ·0169 (·0013
13
39
39

(4) 23) 292100 (12700
23
62
46
161
161
00

(5) 3629) 156330·062 (43·078
14516
11170
10887
28306
25403
29032
29032

(6) 1 | 10000
10000

(7) 72) 30960 (430
288
216
216
0

(8) 52) 7644 (147
52
244
208
364
364

(9) 307) ·0000615228 (·0000002004
614
1228
1228

```
(10) 758)74644·808(98·476
         6822
         ----
          6424
          6064
          ----
           3608
           3032
           ----
            5760
            5306
            ----
             4548
             4548
             ----
```

```
(11) 369)2·4294591(·0065839 ··
         2214
         ----
          2154
          1845
          ----
           3095
           2952
           ----
            1439
            1107
            ----
             3321
             3321
             ----
```

```
(12) 73)63987420000(876540000
        584
        ---
         558
         511
         ---
          477
          438
          ---
           394
           365
           ---
            292
            292
            -------
               0000
```

```
(13) 3500)·2698636500(·0000771039
           24500
           -----
            24863
            24500
            -----
             3636
             3500
             -----
              13650
              10500
              -----
               31500
               31500
               -----
```

```
(14) 9| 2698614000
       -----------
         299846000
```

(15) 65) 13·10530 (·20162
130
105
65
403
390
130
130

(16) 25) 61732500000 (2469300000
50
117
100
173
150
232
225
75
75
00000

(17) 231) 830676 (3596
693
1376
1155
2217
2079
1386
1386

(18) 673) ·00019517 (·00000029
1346
6057
6057

(19) 79) 101910 (1290
79
229
158
711
711
0

(20) 579) 2078·61 (3·59
1737
3416
2895
5211
5211

(21) 527) 241160·47 (457·61
2108
3036
2635
4010
3689
3214
3162
527
527

(22) 854) 65220·834 (76·371
5978
. 5440
5124
3168
2562
6063·
5978
854
854

(23) 518963) 470046066583000 (905741000
4670667 ·
2979366
2594815
3845515
3632741
2127748
2075852
518963
518963
000

Ex. (xlv), p. 80.

(1) 32) 745·00000 (23·28125
64
105
96
90
64
260
256
40
32
80
64
160
160

(2) 128) 143·270000000 (1·119296875
128
152
128
247
128
1190
1152
380
256
1240
1152
880
768
1120
1024
960
896
640
640

(3) 125) 432·6000 (3·4608
375
576
500
760
750
1000
1000

(4) 225) 7432974·00 (33035·44
675
682
675
797
675
1224
1125
990
900
900
900

(5) 625) 1·20000 (·00192
625
5750
5625
1250
1250

(6) 1250) ·2170000 (·0001736
1250
9200
8750
4500
3750
7500
7500

Ex. (xlvi), p. 80.

(1)
4 | 426·4780
4 | 106·619500
26·654875

(2)
8 | ·0784978200
9 | ·0098122275
·0010902475

(3)
5 | 362470
5 | 72494·0
14498·8

(4)
9 | ·0007263
5 | ·00008070
·00001614

(5)
3 | 4200·7437
8 | 1400·2479000
175·0309875

(6)
10 | ·00463
5 | ·0004630
·0000926

(7)
4 | 2471500
4 | 617875
154468·75

(8)
9 | 900000000
4 | 100000000
25000000

(9)
10 | ·001
10 | ·0001
·00001

(10)
2 | ·0010010010
1000 | ·0005005005
·0000005005005

Ex. (xlvii), p. 82.

```
(1)  23 ) 425000·000 ( 18478·260
          23
          ---
          195
          184
          ---
           110
            92
           ---
            180
            161
            ---
             190
             184
             ---
               60
               46
               --
               140
               138
               ---
                 20
```

```
(2)  79 ) 19·700 ( ·249
          158
          ---
          390
          316
          ---
           740
           711
           ---
```

```
(3)  409 ) 37·900 ( ·092
           3681
           ----
            1090
             818
            ----
             272
```

```
(4)  313 ) 2710000000·000 ( 8658146·964
           2504
           ----
            2060
            1878
            ----
             1820
             1565
             ----
              2550
              2504
              ----
               460
               313
               ---
               1470
               1252
               ----
                2180
                1878
                ----
                 3020
                 2817
                 ----
                  2030
                  1878
                  ----
                   1520
                   1252
                   ----
                    268
```

```
(5)  281 ) 26·900 ( ·095
           2529
           ----
            1610
            1405
            ----
             205
```

```
(6)  7 | 229000·000
       ------------
        32714·285
```

Ex. (xlviii), p. 85.

(1) $\frac{7}{20} = \frac{\cdot7}{2} = \cdot35$

(2) $\frac{11}{25} = \frac{44}{100} = \cdot44$

(3)
$$\begin{array}{r|l} 7 & 6\cdot000000 \\ \hline & \cdot\dot{8}5714\dot{2} \end{array}$$

(4)
$$\begin{array}{r|r} 9 & 1\cdot00000 \\ \hline 11 & \cdot1111\dot{1} \\ \hline & \cdot\dot{0}\dot{1}01 \end{array}$$

(5)
$$\begin{array}{l} 999\,)\,1\cdot000\,(\,\cdot\dot{0}0\dot{1} \\ \underline{999} \\ 1000 \end{array}$$

(6)
$$\begin{array}{r} 41\,)\,1\cdot00000\,(\,\cdot\dot{0}243\dot{9} \\ \underline{82} \\ 180 \\ \underline{164} \\ 160 \\ \underline{123} \\ 370 \\ \underline{369} \\ 1 \end{array}$$

(7)
$$\begin{array}{r|l} 3 & 11\cdot0 \\ \hline 7 & 3\cdot6\dot{6} \\ \hline & \cdot\dot{5}2380\dot{9} \end{array}$$

(8) $\frac{13}{60} = \frac{1\cdot3}{6} = \cdot21\dot{6}$

(9)
$$\begin{array}{r} 1375\,)\,17\cdot00000\,(\,\cdot012\dot{3}\dot{6} \\ \underline{1375} \\ 3250 \\ \underline{2750} \\ 5000 \\ \underline{4125} \\ 8750 \\ \underline{8250} \\ 500 \end{array}$$

(10)
$$\begin{array}{r|r} 5 & 129\cdot0 \\ \hline 11 & 25\cdot800 \\ \hline & 2\cdot3\dot{4}\dot{5} \end{array}$$

Ex. (xlix), p. 87.

(1) $\cdot\dot{6} = \frac{6}{9} = \frac{2}{3}$ (2) $\cdot\dot{2}\dot{7} = \frac{27}{99} = \frac{3}{11}$ (3) $\cdot\dot{0}4\dot{5} = \frac{45}{999} = \frac{5}{111}$

(4) $\cdot\dot{3}12\dot{3} = \frac{3123}{9999} = \frac{347}{1111}$ (5) $\cdot\dot{0}07\dot{2} = \frac{72}{9999} = \frac{8}{1111}$

(6) $\cdot\dot{4}02\dot{3} = \frac{4023}{9999} = \frac{447}{1111}$ (7) $\cdot\dot{0}005\dot{4} = \frac{54}{99999} = \frac{6}{11111}$

(8) $\cdot\dot{0}000\dot{9} = \frac{9}{99999} = \frac{1}{11111}$

Ex. (l), p. 88.

(1) $\cdot4\dot{2}\dot{5} = \frac{425-4}{990} = \frac{421}{990}$ (2) $\cdot47\dot{5}\dot{9} = \frac{4759-47}{9900} = \frac{4712}{9900} = \frac{1178}{2475}$

(3) $4\cdot25\dot{3} = \frac{4253-425}{900} = \frac{3828}{900} = \frac{1276}{300} = \frac{319}{75} = 4\frac{19}{75}$

(4) $\cdot004\dot{2}\dot{6} = \frac{426-4}{99000} = \frac{422}{99000} = \frac{211}{49500}$

(5) $53\cdot00\dot{2}4\dot{3} = 53\frac{243}{99900} = 53\frac{27}{11100} = 53\frac{9}{3700}$

(6) $7\cdot2\dot{0}1\dot{1} = 7\frac{2011-2}{9990} = 7\frac{2009}{9990}$

(7) $2\cdot53\dot{0}\dot{6} = 2\frac{5306-53}{9900} = 2\frac{5253}{9900} = 2\frac{1751}{3300}$

Ex. (li), p. 89.

(1)
$$\begin{array}{r|l} 2\cdot577 & 777 \\ \cdot043 & 043 \\ 13\cdot222 & 222 \\ \hline 15\cdot8\dot{4}3 & \dot{0}43 \end{array}$$

(2)
$$\begin{array}{r|l} 14\cdot762 & 626262 \\ 3\cdot549 & 549549 \\ 2\cdot204 & 444444 \\ \hline 20\cdot51\dot{6} & 62025\dot{5}6 \end{array}$$

(3)
$$\begin{array}{r|l} 15\cdot025 & 252525 \\ 13\cdot247 & 247247 \\ \hline 1\cdot7\dot{7}8 & 005\dot{2}78 \end{array}$$

(4)
$$\begin{array}{r|l} \cdot02464 & 646464 \\ \cdot00397 & 397397 \\ \hline \cdot02\dot{0}67 & 24\dot{9}067 \end{array}$$

(5) $3\cdot\dot{7} \times 5\cdot\dot{4}\dot{9} = \frac{37-3}{9} \times \frac{549-5}{99} = \frac{34\times544}{9\times99} = \frac{18496}{891} = 20\frac{676}{891}$

(6) $\cdot007\dot{2} \times \cdot\dot{4}\dot{5} = \frac{72-7}{9000} \times \frac{45}{99} = \frac{65\times5}{9000\times11} = \frac{13}{360\times11} = \frac{13}{3960}$

(7) $3\cdot\dot{4} \div 4\cdot0\dot{9} = \frac{34-3}{9} \div \frac{409-40}{90} = \frac{31\times90}{9\times369} = \frac{310}{369}$

(8) $\cdot0\dot{7}\dot{4} \div \cdot5\dot{9} = \frac{74}{990} \div \frac{59-5}{90} = \frac{74\times90}{990\times54} = \frac{37}{11\times27} = \frac{37}{297}$

Ex. (iii), p. 90.

(1)

$\cdot 0204$
$40\cdot 2$
408
816
$\cdot 82008$

$37\,)\,99966\cdot 6\,(\,2701\cdot 8$
74
259
259
66
37
296
296

(2)

$\cdot 0701$
$700\cdot 01$
701
49070
$49\cdot 070701$

$37\,)\,88866600\,(\,2401800$
74
148
148
66
37
296
296
00

(3)

$150\,)\,13\cdot 000\,(\,\cdot 08\dot{6}$
1200
1000
900
100

$495\,)\,17\cdot 000\,(\,\cdot 0\dot{3}\dot{4}$
1485
2150
1980
170

$3\,|\,61\cdot 0$
$11\,|\,20\cdot\dot{3}3$
$1\cdot\dot{8}\dot{4}$

(4)

$450\,)\,7\cdot 000\,(\,\cdot 01\dot{5}$
$\cdot 450$
2500
2250
250

$165\,)\,31\cdot 000\,(\,\cdot 1\dot{8}\dot{7}$
165
1450
1320
1300
1155
145

$6\,|\,53\cdot 00$
$11\,|\,8\cdot 8\dot{3}3$
$\cdot 8\dot{0}\dot{3}$

(5) $\frac{454206}{3\cdot05\times\cdot073}=\frac{454206}{\cdot22265}=\frac{45420600000}{22265}=2040000$

$\frac{454206}{6\cdot1\times2\cdot04}=\frac{454206}{12\cdot444}=\frac{454206000}{12444}=36500$

(6) $\frac{3833336}{\cdot031\times2\cdot05}=\frac{3833336}{\cdot06355}=\frac{383333600000}{6355}=60320000$

$\frac{3833336}{8\cdot99\times20\cdot8}=\frac{3833336}{186\cdot992}=\frac{3833336000}{186992}=20500$

(7)

35·603
27·61

35603
213618
249221
71206

982·99883

$43\cdot\dot{2}9\dot{1}\times6\cdot2\dot{4}=\frac{43291-43}{999}\times\frac{624-62}{90}$

$=\frac{43248\times562}{999\times90}=\frac{14416\times281}{333\times45}=\frac{4050896}{14985}$

14985) 4050896·0 ($270\cdot3\dot{3}0063396\dot{7}$
29970

105389
104895

49460
44955

45050
44955

95000
89910

50900
44955

59450
44955

144950
134865

100850
89910

109400
104895

4505

(8) $\frac{186\cdot4302}{31\cdot02}=\frac{18643\cdot02}{3102}=6\cdot01$

$\frac{18643\cdot02}{\cdot3102}=\frac{186430200}{3102}=60100$

$\frac{1864302}{3\cdot102}=\frac{1864302000}{3102}=601000$

(9)

421·619
·547

2951333
1686476
2108095

230·625593

4206) 2107206 (501
21030

4206
4206

(10)
$$\begin{array}{l}
713)\,86354{\cdot}7000\,(\,121{\cdot}1145\\
\underline{713}\\
1505\\
\underline{1426}\\
794\\
\underline{713}\\
817\\
\underline{713}\\
1040\\
\underline{713}\\
3270\\
\underline{2852}\\
4180\\
\underline{3565}\\
615
\end{array}$$

(11)
$$\begin{array}{r|l}
7 & 104{\cdot}000000\\ \hline
 & 14{\cdot}\dot{8}5714\dot{2}
\end{array}$$

(12)
$$\begin{array}{l}
974)\,860753{\cdot}5000\,(\,883{\cdot}7304\\
\underline{7792}\\
8155\\
\underline{7792}\\
3633\\
\underline{2922}\\
7115\\
\underline{6818}\\
2970\\
\underline{2922}\\
4800\\
\underline{3896}\\
904
\end{array}$$

(13)
$$\begin{array}{r}
76{\cdot}371\\
\underline{8{\cdot}54}\\
305484\\
381855\\
\underline{610968}\\
652{\cdot}20834
\end{array}$$

$$2{\cdot}9\dot{8}0\dot{1} + 7{\cdot}\dot{4}5\dot{0} = \frac{29801-29}{9990} + \frac{7450-7}{999}$$
$$= \frac{29772\times999}{9990\times7443} = \frac{29772}{74430} = \cdot4$$

(14) $\frac{378\cdot48}{456} = \cdot83$; $\frac{37848}{456} = 83$; $\frac{378480000}{456} = 830000$

(15)
$$\begin{array}{r}
457{\cdot}61\\
\underline{{\cdot}527}\\
320327\\
91522\\
\underline{228805}\\
241{\cdot}16047
\end{array}$$

$$477{\cdot}5\dot{5}8\dot{5} + 21{\cdot}\dot{3}5\dot{1} = \frac{4775585-4775}{9990}$$
$$+ \frac{21351-21}{999} = \frac{4770810\times999}{9990\times21330} = \frac{477081}{21330}$$
$$= \frac{53009}{2370} = 22{\cdot}3\dot{6}$$

(16) $\frac{255\cdot67}{37} = 6\cdot91$; $\frac{2556700}{37} = 69100$; $\frac{25567}{37} = 691$

(17)

$$\begin{array}{l} 579\,)\,20\cdot7861\,(\,\cdot0359 \\ \quad\;\;\underline{1737} \\ \quad\;\;\;3416 \\ \quad\;\;\;\underline{2895} \\ \quad\;\;\;\;5211 \\ \quad\;\;\;\;\underline{5211} \end{array} \qquad \begin{array}{r|l} 4 & \underline{16000000} \\ & \;4000000 \end{array}$$

(18) $5\frac{81}{625} = 5\frac{16\cdot2}{125} = 5\frac{3\cdot24}{25} = 5\frac{\cdot648}{5} = 5\cdot1296$

$3\frac{37}{54} = 3\frac{4\cdot\dot{1}}{6} = 3\cdot6\dot{8}5\dot{1}$

$\cdot109375 = \frac{109375}{1000000} = \frac{21875}{200000} = \frac{4375}{40000} = \frac{875}{8000} = \frac{175}{1600} = \frac{7}{64}$

$\cdot5\dot{7}4\dot{0} = \frac{5740-5}{9990} = \frac{5735}{9990} = \frac{1147}{1998} = \frac{31\times37}{54\times37} = \frac{31}{54}$

(19)

$$\begin{array}{l} 673\,)\,\cdot0019517\,(\,\cdot0000029 \\ \qquad\quad\underline{1346} \\ \qquad\quad\;6057 \\ \qquad\quad\;\underline{6057} \end{array} \qquad \begin{array}{r|l} 8 & \underline{640000000} \\ & \;80000000 \end{array}$$

(20) $4\frac{173}{3125} = 4\frac{173\times8}{3125\times8} = 4\frac{1384}{25000} = 4\frac{5536}{100000} = 4\cdot05536$

$5\frac{43}{540} = 5\frac{4\cdot3}{54} = 5\frac{\cdot4\dot{7}}{6} = 5\cdot07\dot{9}6\dot{2}$

$\cdot9375 = \frac{9375}{1000} = \frac{375}{400} = \frac{15}{16}$

$\cdot4\dot{9}2\dot{5} = \frac{4925-4}{9990} = \frac{4921}{9990} = \frac{133}{270}$

(21)

$$\begin{array}{r} 12\cdot064 \\ \underline{3\cdot64} \\ 8\cdot424 \end{array} \qquad \begin{array}{l} 79\,)\,\cdot0010191\,(\,\cdot0000129 \\ \qquad\quad\underline{79} \\ \qquad\quad229 \\ \qquad\quad\underline{158} \\ \qquad\quad\;711 \\ \qquad\quad\;\underline{711} \end{array}$$

(22)

$$\begin{array}{r} 5\cdot015 \\ \underline{3\cdot05} \\ 1\cdot965 \end{array} \qquad \begin{array}{l} 128\,)\,102400\,(\,800 \\ \qquad\;\,\underline{1024} \\ \qquad\qquad 00 \end{array}$$

(23) $\left(\frac{1\cdot44}{\cdot18} \times \frac{36}{100}\right) \div \left(\frac{\cdot36}{\cdot05} \times \frac{6}{1}\right)$

$= \frac{144 \times 36}{18 \times 100} \div \frac{3600 \times 6}{5} = \frac{144 \times 36 \times 5}{18 \times 100 \times 3600 \times 6}$

$= \frac{8}{20 \times 100 \times 6} = \frac{1}{1500} = \cdot000\dot{6}$

(24) $\left(\frac{\cdot052}{1\cdot3} \times \frac{156}{100}\right) \div \left(\frac{\cdot0624}{14\cdot4} \times \frac{2592}{100}\right)$

$= \frac{52}{1300} \times \frac{156}{100} \times \frac{144000}{624} \times \frac{100}{2592} = \frac{4}{100} \times \frac{144000}{4 \times 2592}$

$= \frac{1440}{2592} = \frac{120}{216} = \frac{10}{18} = \frac{5}{9} = \cdot\dot{5}$

(25) $\cdot404 - \cdot04 = \cdot364$

$3\frac{23}{125} + 4\frac{23}{50} = 3\frac{184}{1000} + 4\frac{46}{100} = 3\cdot184 + 4\cdot46 = 7\cdot644$

$7644\ )\ 364\cdot000000\ (\ \cdot\dot{0}4761\dot{9}$

30576

58240

53508

47320

45864

14560

7644

69160

68796

364

(26) $\frac{1}{2} = \cdot5$

$\frac{1}{3} = \cdot333\dot{3}$

$\cdot03\dot{1}\dot{3}$

$\cdot57\dot{5}\dot{7}$

$1\cdot4\dot{4}\dot{0}4$

(27) $\cdot4607 - \cdot00809 = \cdot45261$

$6\frac{51}{80} - 5\frac{125}{128} = 6\cdot6375 - 5\cdot9765625 = \cdot6609375$

$\frac{\cdot45261}{\cdot6609375} = \frac{4526100}{6609375} = \frac{502900}{734375} = \frac{100580}{146875} = \frac{20116}{29375}$

$29375\ )\ 20116\cdot00000\ (\ \cdot6848$

176250

249100

235000

141000

117500

235000

235000

(28) $\frac{1}{5} = \cdot2$

$\frac{1}{6} = \cdot1666\dot{6}$

$1\cdot271\dot{7}\dot{1}$

$1\cdot353\dot{5}\dot{3}$

$2\cdot9\dot{9}\dot{1}91$

(29) $\frac{24}{17}-\frac{14}{11\times31}=\frac{24\times341-14\times17}{17\times11\times31}=\frac{8184-238}{17\times341}=\frac{7946}{5797}$

$$\begin{array}{l}
5797\,)\,7946\cdot00000\,(\,1\cdot37070 \\
5797 \\
\hline
21490 \\
17391 \\
\hline
40990 \\
40579 \\
\hline
41100 \\
40579 \\
\hline
5210
\end{array}$$

(30) $\frac{27}{14}-\frac{21}{17\times31}=\frac{27\times527-21\times14}{14\times527}=\frac{14229-294}{7378}=\frac{13935}{7378}$

$$\begin{array}{l}
7378\,)\,13935\cdot00000\,(\,1\cdot88872 \\
7378 \\
\hline
65570 \\
59024 \\
\hline
65460 \\
59024 \\
\hline
64360 \\
59024 \\
\hline
53360 \\
51646 \\
\hline
17140 \\
14756 \\
\hline
2384
\end{array}$$

(31)
$$\begin{array}{r|l}
23\cdot07\dot{6} & 666666 \\
19\cdot\dot{2}4\dot{5} & 245245 \\
31\cdot2\dot{0}\dot{3} & 030303 \\
\hline
\multicolumn{2}{r}{73\cdot52\dot{4}94221\dot{4}}
\end{array}$$

(32)
$$\begin{array}{r|l}
23\cdot\dot{0}7\dot{6} & 076076 \\
19\cdot\dot{2}4\dot{5} & 454545 \\
31\cdot20\dot{3} & 333333 \\
\hline
\multicolumn{2}{r}{73\cdot52\dot{4}8639\dot{5}4}
\end{array}$$

(33)
$$\begin{array}{r|l}
29\cdot25\dot{9} & 999 \\
25\cdot047 & 047 \\
\hline
\multicolumn{2}{r}{4\cdot21\dot{2}9\dot{5}2}
\end{array}$$

(34) $3\cdot\dot{7}\times4\cdot0\dot{5}=\frac{37-3}{9}\times\frac{405-40}{90}=\frac{34\times365}{9\times90}=\frac{1241}{9\times9}$

$=\frac{137\cdot\dot{8}}{9}=15\cdot\dot{3}2098765\dot{4}$

(35) $4\cdot2\dot{7}\div\cdot\dot{4}\dot{2}=\frac{427-42}{90}\div\frac{42}{99}=\frac{385\times99}{90\times42}=\frac{55\times11}{10\times6}$

$=\frac{60\cdot5}{6}=10\cdot08\dot{3}$

Ex. (liii), p. 95.

(1) 1|96 (14
1
24 | 96
96

(2) 5|29 (23
4
43 | 129
129

(3) 10|24 (32
9
62 | 124
124

(4) 56|25 (75
49
145 | 725
725

(5) 8|82|09 (297
4
49 | 482
441
587 | 4109
4109

(6) 11|90|25 (345
9
64 | 290
256
685 | 3425
3425

(7) 10|69|29 (327
9
62 | 169
124
647 | 4529
4529

(8) 75|16|89 (867
64
166 | 1116
996
1727 | 12089
12089

(9) 19|36|00 (440
16
84 | 336
336
00

(10) 69|72|25 (835
64
163 | 572
489
1665 | 8325
8325

(11) 36|37|29|61 (6031
36
1203 | 3729
3609
12061 | 12061
12061

(12) 22|07|12|04 (4698

	16
86	607 516
929	9112 8361
9388	75104 75104

(13) 5|50|18|39|36 (23456

	4
43	150 129
464	2118 1856
4685	26239 23425
46906	281436 281436

(14) 52|56|25|00|00 (72500

	49
142	356 284
1445	7225 7225
	0000

(15) 4|12|49|61 (2031

	4
403	1249 1209
4061	4061 4061

(16) 54|61|21|00|00|00 (739000

	49
143	561 429
1469	13221 13221
	000000

(17) 32|23|96|84 (5678

	25
106	723 636
1127	8796 7889
11348	90784 90784

(18) 19|18|10|71|34|44 (437962
16

83 | 318
249

867 | 6910
6069

8749 | 84171
78741

87586 | 543034
525516

875922 | 1751844
1751844

Ex. (liv), p. 96.

(1) 16·|81 (4·1
16

81 | 81
81

(2) 2|81·|90|41 (16·79
1

26 | 181
156

327 | 2590
2289

3349 | 30141
30141

(3) ·90|25 (·95
81

185 | 925
925

(4) ·26|01 (·51
25

101 | 101
101

(5) ·06|25 (·25
4

45 | 225
225

(6) ·00|07|29 (·027

	4
47	329 329

(7) 1|72|42·|31|61 (131·31

	1
23	72 69
261	342 261
2623	8131 7869
26261	26261 26261

(8) 1·|00|20|01 (1·001

	1
2001	002001 2001

(9) 4|44|15·|56|25 (210·75

	4
41	44 41
4207	31556 29449
42145	210725 210725

(10) 1|89|47·|52|25 (137·65

	1
23	89 69
267	2047 1869
2746	17852 16476
27525	137625 137625

Ex. (lv), p. 98.

(1) 20·|00|00|00|00 (4·4721

	16
84	400 336
887	6400 6209
8942	19100 17884
89441	121600 89441
	32159

(2) 30·|00|00|00|00 (5·4772

	25
104	500 416
1087	8400 7609
10947	79100 76629
109542	247100 219084
	28016

(3) ·90|00|00|00 (·9486

	81
184	900
	736
1888	16400
	15104
18966	129600
	113796
	15804

(4) ·12|10|00|00 (·3478

	9
64	310
	256
687	5400
	4809
6948	59100
	55584
	3516

(5) ·16|90|00|00| (·4110

	16
81	90
	81
821	900
	821
8220	7900

(6) ·01|60|00|00 (·1264

	1
22	60
	44
246	1600
	1476
2524	12400
	10096
	2304

(7) ·00|06|40|00 (·0252

	4
45	240
	225
502	1500
	1004
	496

(8) ·00|12|10|00 (·0347

	9
64	310
	256
687	5400
	4809
	591

(9) 16·|24|50|00|00 (4·0305
16

803 | 2450
2409

80605 | 410000
403025

6975

(10) ·99|99|99|99 (·9999
81

189 | 1899
1701

1989 | 19899
17901

19989 | 199899
179901

19998

(11) ·25|25|25|25 (·5025
25

1002 | 2525
2004

10045 | 52125
50225

1900

(12) 42·|03|33|33|33 (6·4833
36

124 | 603
496

1288 | 10733
10304

12963 | 42933
38889

129663 | 404433
388989

15444

Ex. (lvi), p. 99.

(1) $\sqrt{\frac{36}{49}} = \frac{6}{7}$ (2) $\sqrt{\frac{64}{121}} = \frac{8}{11}$ (3) $\sqrt{\frac{289}{625}} = \frac{17}{25}$

(4) 13|69 (37
9

67 | 469
469

75|69 (87
64

167 | 1169
1169

(5)

$$\begin{array}{r|l} & 1|51|29\;(\,123 \\ & 1 \\ \hline 22 & 51 \\ & 44 \\ \hline 243 & \;729 \\ & \;729 \\ \hline \end{array} \qquad \begin{array}{r|l} & 18|23|29\;(\,427 \\ & 16 \\ \hline 82 & 223 \\ & 164 \\ \hline 847 & \;5929 \\ & \;5929 \\ \hline \end{array}$$

(6) $\sqrt{\frac{81}{16}} = \frac{9}{4} = 2\frac{1}{4}$ (7) $\sqrt{\frac{144}{25}} = \frac{12}{5} = 2\frac{2}{5}$

(8) $\sqrt{\frac{529}{169}} = \frac{23}{13} = 1\frac{10}{13}$ (9) $\sqrt{\frac{5329}{81}} = \frac{73}{9} = 8\frac{1}{9}$

(10) $\sqrt{\frac{961}{25}} = \frac{31}{5} = 6\frac{1}{5}$ (11) $\sqrt{\frac{441}{25}} = \frac{21}{5} = 4\frac{1}{5}$

(12) $\sqrt{\frac{576}{49}} = \frac{24}{7} = 3\frac{3}{7}$

(13) $8\,\underline{|\;5{\cdot}000}$ (14) $12\,\underline{|\;5{\cdot}000}$

$\quad{\cdot}625 \qquad\qquad {\cdot}41\dot{6}$

$$\begin{array}{r|l} & {\cdot}62|50|00|00\;(\,{\cdot}7905 \\ & 49 \\ \hline 149 & 1350 \\ & 1341 \\ \hline 5805 & \;\;90000 \\ & \;\;79025 \\ \hline & \;\;10975 \end{array} \qquad \begin{array}{r|l} & {\cdot}41|66|66|66\;(\,{\cdot}6454 \\ & 36 \\ \hline 124 & 566 \\ & 496 \\ \hline 1285 & \;7066 \\ & \;6425 \\ \hline 12904 & \;\;64166 \\ & \;\;51616 \\ \hline & \;\;12550 \end{array}$$

(15)

```
         6·|40|00|00|00 ( 2·5298
         4
       ------
   45 | 240
      | 225
      |------
  502 |  1500
      |  1004
      |-------
 5049 |   49600
      |   45441
      |---------
50588 |    415900
      |    404704
      |----------
             11190
```

(16)

```
        9·|50|00|00|00 ( 3·0822
        9
      ------
  608 | 5000
      | 4864
      |-------
 6162 |  13600
      |  12324
      |--------
61642 |   127600
      |   123284
      |---------
            4316
```

(17)

```
17 ) 14·00000000 ( ·82352941
     136
     ---
       40
       34
       --
        60
        51
        --
         90
         85
         --
          50
          34
          --
          160
          153
          ---
            70
            68
            --
             20
             17
             --
```

```
           76·|82|35|29|41 ( 8·7649
           64
         ------
   167 | 1282
       | 1169
       |-------
  1746 |  11335
       |  10476
       |--------
 17524 |   85929
       |   70096
       |---------
175289 |   1583341
       |   1577601
       |----------
```

Ex. (lvii), p. 101.

(1)		1		4|096 1
	3	6	300 216	3096
			516	3096
(2)		3		32|768 27
	9	2	2700 184	5768
			2884	5768
(3)		4		74|088 64
	12	2	4800 244	10088
			5044	10088
(4)		7		493|039 343
	21	9	14700 1971	150039
			16671	150039
(5)		8		614|125 512
	24	5	19200 1225	102125
			20425	102125

(6) 6 262|144
216
18 4 10800 46144
736
11536 46144

(7) 3 39|304
27
9 4 2700 12304
376
3076 12304

(8) 7 389|017
343
21 3 14700 46017
639
15339 46017

(9) 5 195|112
125
15 8 7500 70112
1264
8764 70112

(10) 9 970|299
729
27 9 24300 241299
2511
26811 241299

(11)		3		59|319
				27
	9	9	2700	32319
			891	
			3591	32319

(12)		6		250|047
				216
	18	3	10800	34047
			549	
			11349	34047

Ex. (lviii), p. 103.

(1)		2		14|706|125
				8
	6	4	1200	6706
			256	
			1456	5824
			16	
	72	5	172800	882125
			3625	
			176425	882125

(2)		5		149|721|291
				125
	15	3	7500	24721
			459	
			7959	23877
			9	
	159	1	842700	844291
			1591	
			844291	844291

(3)		3		28|934|443
				27
	9	0	2700	1934
	90	7	270000	1934443
			6349	
			276349	1934443

(4)		6		300|763|000
				216
	18	7	10800	84763
			1309	
			12109	84763
		0		000

(5)		1		2|097|152
				1
	3	2	300	1097
			64	
			364	728
			4	
	36	8	43200	369152
			2944	
			46144	369152

(6)		1		5|735|339
				1
	3	7	300	4735
			259	
			559	3913
			49	
	51	9	86700	822339
			4671	
			91371	822339

(7)		4		99|252|847
				64
	12	6	4800	35252
			756	
			5556	33336
			36	
	138	3	634800	1916847
			4149	
			638949	1916847

(8)		1		1|092|727
				1
	3	0	300	92
	30	3	30000	92727
			909	
			30909	92727

(9)		2		16|777|216
				8
	6	5	1200	8777
			325	
			1525	7625
			25	
	75	6	187500	1152216
			4536	
			192036	1152216

```
(10)        5               194|104|539
                            125
       15   7     7500       69104
                  1099 )
                  8599 }     60193
                    49 )
      171   9   974700      8911539
                 15471
                990171      8911539

(11)        4               84|027|672
                            64
       12   3     4800       20027
                   369 )
                  5169 }     15507
                     9 )
      129   8   554700      4520672
                 10384
                565084      4520672

(12)        5              130|323|843
                           125
       15   0   7500         5323
      150   7   750000       5323843
                 10549
                760549       5323843

(13)        6               322|828|856
                            216
       18   8   10800       106828
                 1504 )
                12304 }      98432
                   64 )
      204   6   1387200     8396856
                  12276
                1399476     8396856
```

(14)		7		354|894|912
				343
	21	0	14700	11894
	210	8	1470000	11894912
			16864	
			1486864	11894912

(15)		8		700|227|072
				512
	24	8	19200	188227
			1984	
			21184	169472
			64	
	264	8	2323200	18755072
			21184	
			2344384	18755072

(16)		5		134|217|728
				125
	15	1	7500	9217
			151	
			7651	7651
			1	
	153	2	780300	1566728
			3064	
			783364	1566728

(17)		4		122|615|327|232
				64
	12	9	4800	58615
			1161	
			5961	53649
			81	
	147	6	720300	4966327
			8856	
			729156	4374936
			36	
	1488	8	73804800	591391232
			119104	
			73923904	591391232

(18)		8		673|373|097|125
				512
	24	7	19200	161373
			1729	
			20929	146503
			49	
	261	6	2270700	14870097
			15696	
			2286396	13718376
			36	
	2628	5	230212800	1151721125
			131425	
			230344225	1151721125

Ex. (lix), p. 104.

(1)		7		·389|017
				343
	21	3	14700	46017
			639	
			15339	46017

∴ C. R. is ·73.

```
(2)          3                      ·048|228|544
                                      27
                                      ─────
       9     6        2700            21228
                       576⎫
                      ────⎪
                      3276⎬           19656
                        36⎭           ─────
                      ────
     108     4      388800             1572544
                      4336
                    ──────
                    393136             1572544
∴ C. R. is ·364.                       ───────
```

```
(3)          3                      27|054·|036|008
                                    27
                                    ───
       9     0      2700              54
      90     0      270000            54036
     900     2      27000000          54036008
                       18004
                    ────────
                    27018004          54036008
∴ C. R. is 30·02.                     ────────
```

(4) $\sqrt[3]{\frac{1331}{1728}} = \frac{11}{12}$ (5) $\sqrt[3]{\frac{250}{686}} = \sqrt[3]{\frac{125}{343}} = \frac{5}{7}$

(6) $\sqrt[3]{\frac{1715+13}{343}} = \sqrt[3]{\frac{1728}{343}} = \frac{12}{7} = 1\frac{5}{7}$.

```
                  (7)            405
                                 125
                                ─────
                                2025
                                810
                               405
                               ──────
                               50625
                                  28
                               ──────
             3                 50|653
                               27|
                               ──
       9     7      2700       23653
                     679
                    ────
                    3379       23653
∴ C. R. is 37/5, or, 7 2/5.    ─────
```

(8)		1		5·|000|000|000
				1
	3	7	300	4000
			259	
			559	3913
			49	
	51	0	86700	87000
	510	9	8670000	87000000
			45981	
			8715981	78443829
∴ C. R. is 1·709....				8556171

(9)		8		576·|000|000|000
				512
	24	3	19200	64000
			729	
			19929	59787
			9	
	249	2	2066700	4213000
			4984	
			2071684	4143368
			4	
	2496	0	207667200	69632000

∴ C. R. is 8·320....

(10)		4		·121|861|281
				64
	12	9	4800	57861
			1161	
			5961	53649
			81	
	147	5	720300	4212281
			7375	
			727675	3638375
∴ C. R. is ·495....				573906

```
(11)          2                     15·|926|972|504
                                     8
       6      5     1200             7926
                     325
                    1525             7625
                      25
      75      1     187500            301972
                       751
                    188251            188251
                         1
     753      6     18900300          113721504
                       45216
                    18945516          113673096
∴ C. R. is 2·516....                      48408
```

```
(12)         5/9 = ·5̇
              8                   ·555|555|555
                                   512
      24      2     19200          43555
                     484
                    19684          39368
                        4
     246      2     2017200         4187555
                       4924
                    2022124         4044248
∴ C. R. is ·822 . . . .             143307
```

```
(13)          9                  ·750|000|000
                                  729
      27      0     24300         21000
     270      8     2430000       21000000
                      21664
                    2451664       19613312
                                   1386688
∴ C. R. is ·908 . . . .
```

(14)		6		·333|333|333
				216
	18	9	10800	117333
			1701	
			12501	112509
			81	
	207	3	1428300	4824333
			6219	
			1434519	4303557
				520776

∴ C. R. is ·693 . . . .

(15)		1		7·|600|000|000
				1
	3	9	300	6600
			351	
			651	6859
			81	
	57	6	108300	741000
			3456	
			111756	670536
			36	
	588	6	11524800	70464000
			35316	
			11560116	69360696
				1103304

∴ C. R. is 1·966 . . . .

```
(16)        1                  3·|200|000|000
                               1
  ·                            ----
  3    4    300                2200
            136 )
            ---  }
            436                1744
             16 )              -----
            -----
  42   7    58800              456000
             2989 )
            -----  }
            61789              432523
               49 )            ------
            -------
  441  3    6482700            23477000
              13239
            -------
            6495939            19487817
                               --------
∴ C. R. is 1·473 . . . .        3989183
```

Ex. (lx), p. 105.

```
(1)        53|14|41 (729
           49
           ----
   142 |  414
       |  284
       |------
  1449 |  13041
       |  13041
       |------
```

and $\sqrt{}$ 729 = 27

```
(2)        4|10|06|25 (2025
           4
           ----
   402 |  1006
       |   804
       |-------
  4045 |  20225
       |  20225
       |-------
```

and $\sqrt{}$ 2025 = 45

```
(3)        15|75·|29|61 (39·69
           9
           ----
    69 |  675
       |  621
       |-------
   786 |   5429
       |   4716
       |--------
  7929 |    71361
       |    71361
       |--------
```

```
           39·|69 (6·3
           36
           ----
   123 |  369
       |  369
       |-----
```

(4) 4|82|68|09 (2197
4

41	82 41
429	4168 3861
4387	30709 30709

	1		2|197
			1
3	3	300	1197
		99	
		399	1197

$\therefore \sqrt[6]{4826809} = 13$

(5) 2|47|94|91|12|96 (157464
1

25	147 125
307	2294 2149
3144	14591 12576
31486	201512 188916
314924	1259696 1259696

	5		157|464
			125
15	4	7500	32464
		616	
		8116	32464

$\therefore \sqrt{24794911296} = 54$

(6) 28|24|29·|53|64|81 (531·441
25

103	324 309
1061	1529 1061
10624	46853 42496
106284	435764 425136
1062881	1062881 1062881

	8		531|·441
			512
24	1	19200	19441
		241	
		19441	19441

$\therefore \sqrt[6]{282429 \cdot 536481} = 8 \cdot 1$

Ex. (lxi), p. 105.

(1) $72 - 40 = 32$. (2) $56 + 34 = 90$.

(3) $126 \div 2 = 63$; ∴ greater number $= 63 + 5$ or 68;
smaller number $= 63 - 5$ or 58.

(4) $6 \times 12 \times 12 - 6 \times 12 = 864 - 72 = 792$.

(5) $86 - 12 = 74$; ∴ number required is $74 \div 2$, or, 37.

(6) $98 + 17 = 115$; ∴ number required is $115 \div 5$, or, 23.

(7) Smaller number + (smaller number + 14) = 48;
∴ twice the smaller number + 14 = 34 + 14;
∴ twice the smaller number = 34;
∴ smaller number is 17, and greater is 17 + 14, or, 31.

(8) Twice smaller number + 172 = 378;
twice smaller number = 206;
∴ smaller number is 103, and greater is 275.

(9) The son was born in (1822 − 16), or, 1806;
the father was born in (1868 − 93), or, 1775;
∴ age of the father at the son's birth was (1806 − 1775),
or, 31.

(10) Number $= 41 \times 37 = 1517$.

(11) Number $= 1457 \div 47 = 31$.

(12) $\frac{5}{7}$ of the number is 35; ∴ $\frac{1}{7}$ of the number is 7;
∴ the number is 49.

(13) $2 + \frac{1}{3} = \frac{7}{3}$; ∴ $\frac{7}{3}$ of the number is 140;
∴ $\frac{1}{3}$ of the number is 20; ∴ the number is 60.

(14) $\frac{1}{2} + \frac{1}{3} + \frac{1}{4} = \frac{13}{12}$; ∴ $\frac{13}{12}$ of the number is 104;
∴ $\frac{1}{12}$ of the number is 8; ∴ the number is 96.

(15) $\frac{1}{12} + \frac{1}{20} + \frac{1}{40} = \frac{19}{120}$; ∴ $\frac{19}{120}$ of the number is 38;
∴ $\frac{1}{120}$ of the number is 2; ∴ the number is 240.

(16) $\frac{1}{4} - \frac{1}{7} = \frac{3}{28}$; ∴ $\frac{3}{28}$ of the number is 30;
∴ $\frac{1}{28}$ of the number is 10; ∴ the number is 280.

(17) $\frac{1}{25} - \frac{1}{35} = \frac{2}{175}$; ∴ $\frac{2}{175}$ of the number is 8;
∴ $\frac{1}{175}$ of the number is 4; ∴ the number is 700.

(18) $1 - (\frac{1}{3} + \frac{1}{10} + \frac{1}{12}) = 1 - \frac{31}{60} = \frac{29}{60}$;
∴ $\frac{29}{60}$ of the number is 58; ∴ the number is 120.

(19) $\frac{1}{4} + \frac{1}{5} + \frac{1}{10} = \frac{33}{60}$; ∴ $\frac{33}{60}$ of the number = 33;
∴ $\frac{1}{60}$ of the number is 1; ∴ the number is 60.

(20) $(\frac{1}{4} + \frac{1}{5} + \frac{1}{6}) - \frac{1}{2} = \frac{37}{60} - \frac{30}{60} = \frac{7}{60}$;
∴ $\frac{7}{60}$ of the number is 112; ∴ $\frac{1}{60}$ of the number is 16;
∴ the number is 960.

(21) $\frac{6}{7}$ of the number is 1626; ∴ $\frac{1}{7}$ of the number is 271;
∴ the number is 1897.

(22) The smaller number is $\frac{2}{3}$ of the greater;
∴ $(1 + \frac{2}{3})$ of greater = 5760; ∴ $\frac{5}{3}$ of greater = 5760;
∴ greater number is 3456, and smaller 2304.

(23) $(1 + \frac{2}{7})$ of the greater part = 1800; $\frac{9}{7}$ of greater is 1800
∴ greater is 1400, and less 400.

(24) $\frac{4}{3}$ of number = 24; ∴ $\frac{1}{3}$ of number = 6;
∴ number is 18.

(25) Smaller part + (smaller part + 24) = 60;
∴ twice the smaller + 24 = 36 + 24;
∴ twice the smaller = 36;
∴ smaller = 18, and greater = 42.

(26) Smaller + ($\frac{3}{7}$ of smaller + 59) = 129;
∴ smaller + $\frac{3}{7}$ of smaller = 70.
∴ $\frac{10}{7}$ of smaller = 70;
∴ smaller = 49, and greater = 80.

(27) Divisor $= (2{\cdot}49 - {\cdot}37) \div 4 = 2{\cdot}12 \div 4 = {\cdot}53.$

(28) Dividend $= ({\cdot}027 \times 6116) + {\cdot}003 = 165{\cdot}132 + {\cdot}003$
$= 165{\cdot}135.$

(29) Twice the square of 12 $= 2 \times (12 \times 12) = 288$;
the square of twice 12 $= (2 \times 12) \times (2 \times 12) = 576$;
∴ difference is $576 - 288$, or, 288.

(30) $\frac{1}{2} + \frac{1}{4} + \frac{1}{6} = \frac{11}{12}$;
∴ $\frac{1}{12}$ of the trees are cherry-trees;
∴ $\frac{1}{12}$ of trees $= 50$;
∴ number of trees is 600.

(31) A unit is $\frac{1}{25}$ of 25 units;
∴ $\frac{5}{8}$ of a unit is $\frac{5}{8}$ of $\frac{1}{25}$, or, $\frac{1}{40}$ of 25 units.

(32) $\frac{3}{4}$ of square root of number $= 21$;
∴ square root of number $= 28$;
∴ number $= 28 \times 28 = 784.$

(33) $\frac{5}{7}$ of square of number $= 140$;
∴ square of number $= 196$;
∴ number $= \sqrt{196} = 14.$

(34) $\frac{4}{5}$ of cube root of number $= 12$;
∴ cube root of number $= 15$;
∴ number $= 15 \times 15 \times 15 = 3375.$

(35) $\frac{8}{13}$ of cube of number $= 36504$;
∴ cube of number $= 4563 \times 13 = 9 \times 507 \times 13$
$= 9 \times 3 \times 169 \times 13 = 3 \times 3 \times 3 \times 13 \times 13 \times 13$;
∴ number $= 3 \times 13 = 39.$

(36) $\frac{2}{3}$ of (number $+ 21) = 23$;
∴ number $+ 21 = 34\frac{1}{2}$;
∴ number $= 13\frac{1}{2}.$

(37) $\frac{3}{5}$ of (number − 37) = 18;
∴ number − 37 = 30;
∴ number = 67.

(38) $\frac{5}{6}$ of the result is $\frac{10}{21}$;
∴ the result is $\frac{12}{21}$ or $\frac{4}{7}$;
∴ square root of the number = $\frac{4}{7} + 1\frac{2}{7} = \frac{13}{7}$;
∴ number = $\frac{13}{7} \times \frac{13}{7} = \frac{169}{49} = 3\frac{22}{49}$.

(39) Quotient = 17 + 3 = 20;
product = 20 × 3 = 60;
sum = 60 ÷ 4 = 15;
number = 15 − 2 = 13.

(40) $8 \times 8 \times 8 \times 8 \times 8 \times 8 \times 8 = 2^3 \times 2^3 \times 2^3 \times 2^3 \times 2^3 \times 2^3 \times 2^3$
= the 21st power of 2
= the cube of the 7th power of 2.

(41) $\frac{1}{2} \times \frac{1}{3} = \frac{1}{6}$
∴ square of number = 864 × 6 = 5184;
∴ number = $\sqrt{5184} = 72$.

(42) $\frac{1}{7} \times \frac{1}{8} = \frac{1}{56}$; and $298\frac{2}{3} \times 3 = 896$;
∴ square of number = 896 × 56 = 50176;
∴ number = $\sqrt{50176} = 224$.

END OF PURE ARITHMETIC.

COMMERCIAL ARITHMETIC.

Ex. (lxii), p. 110.

(1) $3\frac{1}{4}$*d.* = 13*q.*; $7\frac{1}{2}$*d.* = 30*q.*; 9*d.* = 36*q.*; $11\frac{3}{4}$*d.* = 47*q.*

(2) 2*s.* 3*d.* = 27*d.* = 108*q.*; 5*s.* $7\frac{1}{2}$*d.* = $67\frac{1}{2}$*d.* = 270*q*
12*s.* $9\frac{3}{4}$*d.* = $153\frac{3}{4}$*d.* = 615*q.*; 17*s.* $7\frac{1}{4}$*d.* = $211\frac{1}{4}$*d.* = 845*q.*

(3) £3. 12*s.* = 72*s.* = 864*d.* = 3456*q.*
£5 = 100*s.* = 1200*d.* = 4800*q.*
£2. 17*s.* $6\frac{1}{2}$*d.* = 57*s.* $6\frac{1}{2}$*d.* = $690\frac{1}{2}$*d.* = 2762*q.*
£17. 4*s.* $5\frac{3}{4}$*d.* = 344*s.* $5\frac{3}{4}$*d.* = $4133\frac{3}{4}$*d.* = 16535*q.*

(4) 6*s.* = 72*d.*; 4*s.* 10*d.* = 58*d.*; 7*s.* 10*d.* = 94*d.*
8*s.* 9*d.* = 105*d.*; 13*s.* 7*d.* = 163*d.*

(5) £4 = 80*s.* = 960*d.*; £5. 2*s.* 4*d.* = 102*s.* 4*d.* = 1228*d.*
£17. 14*s.* 5*d.* = 354*s.* 5*d.* = 4253*d.*;
£58. 13*s.* 11*d.* = 1173*s.* 11*d.* = 14087*d.*

(6) £174. 10*s.* = 3490*s.* = 41880*d.*;
£432. 15*s.* 10*d.* = 8655*s.* 10*d.* = 103870*d.*
£1274. 17*s.* 9*d.* = 25497*s.* 9*d.* = 305973*d.*

Ex. (lxiii), p. 111.

(1) $\frac{57}{4}$*d.* = $14\frac{1}{4}$*d.*

(2) $\frac{173}{4}$*d.* = $43\frac{1}{4}$*d.*

(3) $\frac{197}{4}$*d.* = $49\frac{1}{4}$*d.*

(4) $\frac{357}{4}$*d.* = $89\frac{1}{4}$*d.* = 7*s.* $5\frac{1}{4}$*d.*

(5) $\frac{479}{4}$*d.* = $119\frac{3}{4}$*d.* = 9*s.* $11\frac{3}{4}$*d.*

(6) $\frac{747}{4}$*d.* = $186\frac{3}{4}$*d.* = 15*s.* $6\frac{3}{4}$*d.*

(7)
$$\begin{array}{r|l} 4 & 4238 \\ \hline 12 & 1059\ .\ 2q. \\ \hline 2{,}0 & 8{,}8\ .\ 3d. \\ \hline & £4.\ 8s.\ 3\tfrac{1}{2}d. \end{array}$$

(8)
$$\begin{array}{r|l} 4 & 376289 \\ \hline 12 & 94072\ .\ 1q. \\ \hline 2{,}0 & 783{,}9\ .\ 4d. \\ \hline & £391.\ 19s.\ 4\tfrac{1}{4}d. \end{array}$$

(9)
$$\begin{array}{r|l} 4 & 542380 \\ \hline 12 & 135595 \\ \hline 2{,}0 & 1129{,}9\ .\ 7d. \\ \hline & £564.\ 19s.\ 7d. \end{array}$$

Ex. (lxiv), p. 112.

(1) £27. 12s. 6d. = $(27 \times 8) + 5$, or, 221 half-crowns.

(2) £2352 = $\frac{2352 \times 20}{21}$ guineas, or, 2240 guineas.

(3) 4360 guineas = $\frac{4360 \times 21}{20}$ pounds, or, 4578 pounds.

(4) 15225 half-crowns = $\frac{15225 \times 5}{21}$ half-guineas, or, 3625 half-guineas.

(5) 627 florins = (627×6) fourpenny pieces, or, 3762 fourpenny pieces.

(6) 246 guineas = $\frac{246 \times 21}{2}$ florins, or, 2583 florins.

(7) 42375 half-guineas = $\frac{42375 \times 21}{5}$ half-crowns, or, 177975 half-crowns.

Ex. (lxv), p. 113.

(1) $1\frac{1}{4}$*d.* (2) $1\frac{3}{4}$*d.* (3) $2\frac{3}{4}$*d.* (4) $3\frac{3}{4}$*d.*
(5) $4\frac{1}{4}$*d.* (6) $4\frac{3}{4}$*d.* (7) $5\frac{1}{4}$*d.* (8) $6\frac{3}{4}$*d.*
(9) $7\frac{1}{2}$*d.* (10) $8\frac{3}{4}$*d.* (11) 9*d.* (12) $9\frac{3}{4}$*d.*
(13) $10\frac{1}{2}$*d.* (14) $11\frac{3}{4}$*d.* (15) $14\frac{3}{4}$*d.* (16) $15\frac{3}{4}$*d.*

(17) 17¼*d.* (18) 18¾*d.* (19) 21¾*d.*
(20) 23½*d.* (21) 1*s.* 7*d.* (22) 1*s.* 11*d.*
(23) 2*s.* 3*d.* (24) 2*s.* 9*d.* (25) 3*s.* 3*d.*
(26) 3*s.* 7*d.* (27) 4*s.* 9*d.* (28) 5*s.* 8*d.*
(29) 6*s.* 2*d.* (30) 7*s.* 2*d.* (31) 8*s.* 3*d.*
(32) 8*s.* 9*d.* (33) 9*s.* 9*d.* (34) 10*s.* 6*d.*
(35) 11*s.* 2*d.* (36) 12*s.* 1*d.* (37) 13*s.* 7*d.*
(38) 14*s.* 11*d.* (39) 16*s.* 3*d.* (40) 20*s.* 7*d.*
(41) £1. 7*s.* (42) £1. 19*s.* (43) £2. 17*s.*
(44) £3. 19*s.* (45) £4. 13*s.* (46) £5. 7*s.*
(47) £6. 9*s.* (48) £7. 5*s.* (49) £8. 16*s.*
(50) £9. 18*s.* (51) £11. 15*s.* (52) £12. 7*s.*
(53) £12. 18*s.* (54) £13. 13*s.* (55) £14. 17*s.*
(56) £17. 5*s.* (57) £18. 13*s.* (58) £20. 12*s.*
(59) £21. 17*s.* (60) £22. 19*s.*

Ex. (lxvi), p. 115.

(1) 10*d.* (2) 11⅓*d.* (3) 9¾*d.*
(4) 11*d.* (5) 19*s.* 10*d.* (6) 19*s.* 3*d.*
(7) 18*s.* 4*d.* (8) 18*s.* 5*d.* (9) 13*s.* 10¾*d.*
(10) 18*s.* 1⅓*d.* (11) 18*s.* 6¾*d.* (12) 18*s.* 10¼*d.*
(13) £21. 15*s.* 1*d.* (14) £31. 8*s.* 0*d.*
(15) £32. 15*s.* 2*d.* (16) £31. 12*s.* 9*d.*
(17) £23. 13*s.* 8¼*d.* (18) £33. 18*s.* 4¾*d.*
(19) £32. 9*s.* 3¾*d.* (20) £32. 6*s.* 5*d.*
(21) £169. 5*s.* 1*d.* (22) £181. 18*s.* 6*d.*
(23) £240. 19*s.* 7*d.* (24) £168. 11*s.*
(25) £200. 17*s.* 11¼*d.* (26) £220. 6*s.* 9¾*d.*
(27) £3602. 17*s.* 6*d.* (28) £14801. 0*s.* 2¾*d.*
(29) £21906. 1*s.* 1*d.* (30) £10841. 11*s.* 7½*d.*
(31) £34. 17*s.* 7¾*d.* (32) £341. 2*s.* 3¼*d.*
(33) £403. 15*s.* 9¾*d.* (34) £3298. 11*s.* 6¼*d.*
(35) £4393. 2*s.* 9½*d.* (36) £5218. 9*s.* 3¾*d.*

(37) £5042. 17*s.* 4*d.*
(38) £14203. 13*s.* 2*d.*
(39) £15170. 7*s.* 10*d.*
(40) £46110. 1*s.* 2*d.*
(41) £52597. 13*s.* 11*d.*
(42) £29275. 3*s.* 10*d.*
(43) £33739. 19*s.* 10*d.*
(44) £31713. 12*s.* 10*d.*
(45) £28702. 7*s.* 8*d.*
(46) £49097. 6*s.* 10*d.*
(47) £26061. 13*s.* 2*d.*
(48) £37974. 8*s.* 6*d.*
(49) £36009. 19*s.* 8*d.*
(50) £27924. 2*s.* 6*d.*
(51) £62725. 11*s.* 9*d.*

Ex. (lxvii), p. 119.

(1) £36. 3*s.* 5*d.* (2) £28. 0*s.* 10*d.* (3) £8. 18*s.* 11*d.*
(4) £238. 17*s.* 10¼*d.* (5) 14*s.* 1¾*d.* (6) £1. 16*s.* 7¾*d.*
(7) 1¾*d.* (8) £1519. 12*s.* 9½*d.*
(9) £36108. 17*s.* 6¾*d.* (10) £1219. 19*s.* 10½*d.*

Ex. (lxviii), p. 121.

(1)
$$\begin{array}{rrrrr} & \textit{s.} & & \textit{d.} \\ & 7 & . & 3 \\ & & & 4 \\ \hline \text{£}1 & . \; 9 & . & 0 \end{array}$$

(2)
$$\begin{array}{rrr} \textit{s.} & & \textit{d.} \\ 1 & . & 2 \\ & & 5 \\ \hline \textit{s.}5 & . & 10 \end{array}$$

(3)
$$\begin{array}{r} \textit{d.} \\ 7\frac{1}{2} \\ 6 \\ \hline \textit{s.}3 \; . \; 9 \end{array}$$

(4)
$$\begin{array}{rrrrr} & \textit{s.} & & \textit{d.} \\ & 9 & . & 6 \\ & & & 7 \\ \hline \text{£}3 & . \; 6 & . & 6 \end{array}$$

(5)
$$\begin{array}{rrr} \textit{s.} & & \textit{d.} \\ 2 & . & 4 \\ & & 8 \\ \hline \textit{s.}18 & . & 8 \end{array}$$

(6)
$$\begin{array}{rrrrr} & \textit{s.} & & \textit{d.} \\ & 2 & . & 2\frac{1}{2} \\ & & & 10 \\ \hline \text{£}1 & . \; 2 & . & 1 \end{array}$$

(7)
$$\begin{array}{rrrrr} \text{£} & & \textit{s.} & & \textit{d.} \\ 2 & . & 1 & . & 4 \\ & & & & 11 \\ \hline \text{£}22 & . & 14 & . & 8 \end{array}$$

(8)
$$\begin{array}{rrrrr} \text{£} & & \textit{s.} & & \textit{d.} \\ 1 & . & 4 & . & 3 \\ & & & & 12 \\ \hline \text{£}14 & . & 11 & . & 0 \end{array}$$

(9)
s. . d.
17 . 6
2
1 . 15 . 0
7
£12 . 5 . 0

(10)
s. . d.
7 . 10½
3
1 . 3 . 7½
5
£5 . 18 . 1½

(11)
£ . s.
1 . 7
2
2 . 14
8
£21 . 12

(12)
s. . d.
17 . 6
2
1 . 15 . 0
9
£15 . 15 . 0

(13)
£ . s. . d.
5 . 11 . 4
4
22 . 5 . 4
5
£111 . 6 . 8

(14)
s. . d.
5 . 7½
3
16 . 10½
7
£5 . 18 . 1½

(15)
£ . s. . d.
5 . 11 . 4
2
11 . 2 . 8
11
£122 . 9 . 4

(16)
£ . s. . d.
4 . 7 . 2
6
26 . 3 . 0
4
£104 . 12 . 0

(17)
s. . d.
4 . 6
5
1 . 2 . 6
5
£5 . 12 . 6

(18)
s. . d.
5 . 11½
3
17 . 10½
9
£8 . 0 . 10½

(19)

$$\begin{array}{rrr} & \text{s.} & \text{d.} \\ & 2\ . & 8 \\ & & 4 \\ \hline & 10\ . & 8 \\ & & 7 \\ \hline \pounds 3\ . & 14\ . & 8 \end{array}$$

(20)

$$\begin{array}{rr} \pounds & \text{s.} \\ 1\ . & 12 \\ & 5 \\ \hline 8\ . & 0 \\ & 6 \\ \hline \pounds 48\ . & 0 \end{array}$$

(21)

$$\begin{array}{rr} \pounds & \text{s.} \\ 1\ . & 2 \\ & 3 \\ \hline 3\ . & 6 \\ & 11 \\ \hline \pounds 36\ . & 6 \end{array}$$

(22)

$$\begin{array}{rrr} \pounds & \text{s.} & \text{d.} \\ 1\ . & 2\ . & 6 \\ & & 5 \\ \hline 5\ . & 12\ . & 6 \\ & & 7 \\ \hline \pounds 39\ . & 7\ . & 6 \end{array}$$

(23)

$$\begin{array}{rrr} & \text{s.} & \text{d.} \\ & 6\ . & 2\frac{1}{2} \\ & & 4 \\ \hline 1\ . & 4\ . & 10 \\ & & 9 \\ \hline \pounds 11\ . & 3\ . & 6 \end{array}$$

(24)

$$\begin{array}{rrr} \pounds & \text{s.} & \text{d.} \\ 1\ . & 12\ . & 6 \\ & & 6 \\ \hline 9\ . & 15\ . & 0 \\ & & 7 \\ \hline \pounds 68\ . & 5\ . & 0 \end{array}$$

(25)

$$\begin{array}{rrr} & \text{s.} & \text{d.} \\ & 19\ . & 10 \\ & & 4 \\ \hline 3\ . & 19\ . & 4 \\ & & 11 \\ \hline \pounds 43\ . & 12\ . & 8 \end{array}$$

(26)

$$\begin{array}{rrr} & \text{s.} & \text{d.} \\ & 19\ . & 4 \\ & & 9 \\ \hline 8\ . & 14\ . & 0 \\ & & 5 \\ \hline \pounds 43\ . & 10\ . & 0 \end{array}$$

(27)

$$\begin{array}{rrr} & \text{s.} & \text{d.} \\ & 3\ . & 7 \\ & & 12 \\ \hline 2\ . & 3\ . & 0 \\ & & 4 \\ \hline \pounds 8\ . & 12\ . & 0 \end{array}$$

(28)

$$\begin{array}{rrr} & \text{s.} & \text{d.} \\ & 2\ . & 5\frac{1}{2} \\ & & 10 \\ \hline 1\ . & 4\ . & 7 \\ & & 5 \\ \hline \pounds 6\ . & 2\ . & 11 \end{array}$$

(29)
$$\begin{array}{r}
\text{s.}\quad \text{d.}\\
3 \;.\; 2\tfrac{1}{4}\\
7\\ \hline
1 \;.\; 2 \;.\; 3\tfrac{3}{4}\\
11\\ \hline
£12 \;.\; 5 \;.\; 5\tfrac{1}{4}
\end{array}$$

(30)
$$\begin{array}{r}
\text{d.}\\
3\tfrac{1}{2}\\
4\\ \hline
1 \;.\; 2\\
8\\ \hline
9 \;.\; 4\\
7\\ \hline
£3 \;.\; 5 \;.\; 4
\end{array}$$

(31)
$$\begin{array}{r}
\text{d.}\\
5\tfrac{1}{2}\\
8\\ \hline
3 \;.\; 8\\
6\\ \hline
1 \;.\; 2 \;.\; 0\\
7\\ \hline
£7 \;.\; 14 \;.\; 0
\end{array}$$

(32)
$$\begin{array}{r}
\text{s.}\quad \text{d.}\\
5 \;.\; 4\\
9\\ \hline
2 \;.\; 8 \;.\; 0\\
10\\ \hline
24 \;.\; 0 \;.\; 0\\
4\\ \hline
£96 \;.\; 0 \;.\; 0
\end{array}$$

(33)
$$\begin{array}{r}
\text{s.}\quad \text{d.}\\
1 \;.\; 4\\
8\\ \hline
10 \;.\; 8\\
7\\ \hline
3 \;.\; 14 \;.\; 8\\
10\\ \hline
£37 \;.\; 6 \;.\; 8
\end{array}$$

Ex. (lxix), p. 123.

(1)
$$\begin{array}{rl}
\text{s.}\quad \text{d.} & \\
4 \;.\; 6 & \\
4 & \\ \hline
18 \;.\; 0 & \text{for } 4\\
7 & \\ \hline
6 \;.\; 6 \;.\; 0 & \text{for } 28\\
4 \;.\; 6 & \text{for } 1\\ \hline
£6 \;.\; 10 \;.\; 6 & \text{for } 29
\end{array}$$

(2)
$$\begin{array}{rl}
\text{s.}\quad \text{d.} & \\
12 \;.\; 6\tfrac{1}{2} & \\
4 & \\ \hline
2 \;.\; 10 \;.\; 2 & \text{for } 4\\
9 & \\ \hline
22 \;.\; 11 \;.\; 6 & \text{for } 36\\
1 \;.\; 17 \;.\; 7\tfrac{1}{2} & \text{for } 3\\ \hline
£24 \;.\; 9 \;.\; 1\tfrac{1}{2} & \text{for } 39
\end{array}$$

(3)

	s.	d.	
	1	6½	
		5	
	7	8½	for 5
		9	
3	9	4½	for 45
	3	1	for 2
£3	12	5½	for 47

(4)

	s.	d.	
	1	8	
		7	
	11	8	for 7
		10	
5	16	8	for 70
	1	8	for 1
£5	18	4	for 71

(5)

	s.	d.	
	6	8	
		12	
4	0	0	for 12
		7	
28	0	0	for 84
1	13	4	for 5
£29	13	4	for 89

(6)

	s.	d.	
	5	6½	
		12	
3	6	6	for 12
		10	
33	5	0	for 120
	16	7½	for 3
£34	1	7½	for 123

(7)

£	s.	d.	
1	3	2	
		12	
13	18	0	for 12
		12	
166	16	0	for 144
1	3	2	for 1
£167	19	2	for 145

(8)

£	s.	d.	
7	1	3	
		10	
70	12	6	for 10
		10	
706	5	0	for 100
		10	
7062	10	0	for 1000
		2	
14125	0	0	for 2000
706	5	0	for 100
353	2	6	for 50
28	5	0	for 4
£15212	12	6	for 2154

(9)

£	s.	d.	
1	18	6¾	
		10	
19	5	7½	for 10
		10	
192	16	3	for 100
		10	
1928	2	6	for 1000
		3	
5784	7	6	for 3000
385	12	6	for 200
19	5	7½	for 10
£6189	5	7½	for 3210

(10)

£	s.	d.	
2	15	4½	
		10	
27	13	9	for 10
		10	
276	17	6	for 100
		10	
2768	15	0	for 1000
		2	
5537	10	0	for 2000
276	17	6	for 100
193	16	3	for 70
13	16	10½	for 5
£6022	0	7½	for 2175

(11)

£	s.	d.	
2	6	9¼	
		10	
23	7	8½	for 10
		10	
233	17	1	for 100
		10	
2338	10	10	for 1000
		3	
7015	12	6	for 3000
1403	2	6	for 600
187	1	8	for 80
9	7	1	for 4
£8615	3	9	for 3684

Ex. (lxx), p. 124.

(1) 6¾*d.*
(2) 1*s.* 5½*d.*
(3) 2*s.* 9¼*d.*
(4) 5*s.*
(5) 4*s.* 10½*d.*
(6) 8*s.* 7½*d.*
(7) 3*s.* 7*d.*
(8) 2*s.* 11¾*d.*
(9) 3*s.* 9*d.*

(10)	6*s*. 3¼*d*.	(11)	5*s*. 5¼*d*.	(12)	10*s*. 6½*d*.
(13)	4*s*. 3*d*.	(14)	7*s*. 6*d*.	(15)	9*s*. 9*d*.
(16)	11*s*. 3*d*.	(17)	14*s*. 6*d*.	(18)	16*s*. 9*d*.
(19)	17*s*. 3*d*.	(20)	19*s*. 9*d*.	(21)	4*s*. 10½*d*.
(22)	6*s*. 1½*d*.	(23)	9*s*. 8¼*d*.	(24)	11*s*. 4*d*.
(25)	7*s*. 9½*d*.	(26)	14*s*. 7½*d*.	(27)	13*s*. 0¾*d*.
(28)	9*s*. 7*d*.	(29)	5*s*. 5*d*.	(30)	9*s*. 11*d*.
(31)	15*s*. 1½*d*.	(32)	£1. 10*s*. 0¾*d*.	(33)	£1. 6*s*. 5¾*d*.
(34)	£1. 10*s*. 5½*d*.	(35)	10*s*. 8¼*d*.	(36)	£1. 1*s*. 3½*d*.
(37)	£1. 10*s*. 9¾*d*.	(38)	£2. 1*s*. 3*d*.	(39)	£3. 14*s*. 9¼*d*.

Ex. (lxxi), p. 126.

I.

(1)
$$\begin{array}{r|rcrcr} & \text{£} & & s. & & d. \\ 3 & 1 & . & 3 & . & 7\frac{1}{2} \\ \cline{2-6} & & & 7 & . & 10\frac{1}{2} \end{array}$$

(2)
$$\begin{array}{r|rcrcr} & \text{£} & & s. & & d. \\ 7 & 39 & . & 7 & . & 6 \\ \cline{2-6} & 5 & . & 12 & . & 6 \end{array}$$

(3)
$$\begin{array}{r|rcrcr} & \text{£} & & s. & & d. \\ 12 & 11 & . & 3 & . & 6 \\ \cline{2-6} & & & 18 & . & 7\frac{1}{2} \end{array}$$

(4)
$$\begin{array}{r|rcrcr} & \text{£} & & s. & & d. \\ 11 & 43 & . & 12 & . & 8 \\ \cline{2-6} & 3 & . & 19 & . & 4 \end{array}$$

(5)
$$\begin{array}{r|rcrcr} & \text{£} & & s. & & d. \\ 10 & 6 & . & 2 & . & 11 \\ \cline{2-6} & & & 12 & . & 3\frac{1}{2} \end{array}$$

(6)
$$\begin{array}{r|rcrcr} & \text{£} & & s. & & d. \\ 12 & 22 & . & 11 & . & 6 \\ \cline{2-6} & 1 & . & 17 & . & 7\frac{1}{2} \end{array}$$

II.

(1)
$$\begin{array}{r|rcrcr} & \text{£} & & s. & & d. \\ 6 & 98 & . & 11 & . & 9 \\ \cline{2-6} 9 & 16 & . & 8 & . & 7\frac{1}{2} \\ \cline{2-6} & 1 & . & 16 & . & 6\frac{1}{6} \end{array}$$

(2)
$$\begin{array}{r|rcrcr} & \text{£} & & s. & & d. \\ 7 & 13 & . & 7 & . & 9 \\ \cline{2-6} 9 & 1 & . & 18 & . & 3 \\ \cline{2-6} & & & 4 & . & 3 \end{array}$$

(3)
$$\begin{array}{r|rcrcr} & \text{£} & & s. & & d. \\ 12 & 29 & . & 14 & . & 0 \\ \cline{2-6} 9 & 2 & . & 9 & . & 6 \\ \cline{2-6} & & & 5 & . & 6 \end{array}$$

(4)
$$\begin{array}{r|rcrcr} & \text{£} & & s. & & d. \\ 12 & 15 & . & 8 & . & 0 \\ \cline{2-6} 11 & 1 & . & 5 & . & 8 \\ \cline{2-6} & & & 2 & . & 4 \end{array}$$

(5)
$$\begin{array}{r|rrr}
 & \pounds & s. & d. \\
 & 3\ . & 9\ . & 4\frac{1}{2} \\ \hline
5 & & 7\ . & 8\frac{1}{2} \\ \hline
 & & 1\ . & 6\frac{1}{2}
\end{array}$$

(6)
$$\begin{array}{r|rrr}
 & \pounds & s. & d. \\
4 & 43\ . & 12\ . & 8 \\ \hline
11 & 10\ . & 18\ . & 2 \\ \hline
 & & 19\ . & 10
\end{array}$$

III.

(1)
$$\begin{array}{l}
\qquad\quad \pounds \quad\ s. \quad\ d. \\
145\,)\,167\ .\ 19\ .\ 2\,(\pounds 1 \\
\qquad \underline{145} \\
\qquad\ \ 22 \\
\qquad\ \ \underline{20} \\
\qquad 459\,(\,3s. \\
\qquad \underline{435} \\
\qquad\ \ 24 \\
\qquad\ \ \underline{12} \\
\qquad 290\,(\,2d. \\
\qquad \underline{290}
\end{array}$$

Quotient £1. 3*s.* 2*d.*

(2)
$$\begin{array}{l}
\qquad\quad \pounds \quad\ s. \quad\ d. \\
241\,)\,40\ .\ 8\ .\ 4\frac{1}{4} \\
\qquad \underline{20} \\
\qquad 808\,(\,3s. \\
\qquad \underline{723} \\
\qquad\ \ 85 \\
\qquad\ \ \underline{12} \\
\qquad 1024\,(\,4d. \\
\qquad \underline{964} \\
\qquad\ \ 60 \\
\qquad\ \ \ \underline{4} \\
\qquad 241\,(\,1q. \\
\qquad \underline{241}
\end{array}$$

Quotient 3*s.* 4¼*d.*

(3)
$$\begin{array}{l}
\qquad\quad \pounds \quad\ s. \quad\ d. \\
365\,)\,453\ .\ 11\ .\ 9\frac{1}{4}\,(\pounds 1 \\
\qquad \underline{365} \\
\qquad\ \ 88 \\
\qquad\ \ \underline{20} \\
\qquad 1771\,(\,4s. \\
\qquad \underline{1460} \\
\qquad\ \ 311 \\
\qquad\ \ \ \underline{12} \\
\qquad 3741\,(\,10d. \\
\qquad \underline{3650} \\
\qquad\ \ 91 \\
\qquad\ \ \ \underline{4} \\
\qquad 365\,(\,1q. \\
\qquad \underline{365}
\end{array}$$

Quotient £1. 4*s.* 10¼*d.*

(4)
$$\begin{array}{l}
\qquad\quad \pounds \quad\ s. \quad\ d. \\
9652\,)\,40669\ .\ 2\ .\ 1\,(\pounds 4 \\
\qquad \underline{38608} \\
\qquad\ \ 2061 \\
\qquad\ \ \ \ \underline{20} \\
\qquad 41222\,(\,4s. \\
\qquad \underline{38608} \\
\qquad\ \ 2614 \\
\qquad\ \ \ \ \underline{12} \\
\qquad 31369\,(\,3d. \\
\qquad \underline{28956} \\
\qquad\ \ 2413 \\
\qquad\ \ \ \ \ \underline{4} \\
\qquad 9652\,(\,1q. \\
\qquad \underline{9652}
\end{array}$$

Quotient £4. 4*s.* 3¼*d.*

(5)

```
          £    s.   d.
291 ) 93 . 1 . 2¼
      20
      ----
      1861 ( 6s.
      1746
      ----
       115
        12
      ----
      1382 ( 4d.
      1164
      ----
       218
         4
      ----
       873 ( 3q.
       873
      ----
```

Quotient 6*s*. $4\frac{3}{4}$*d*.

(6)

```
          £     s.   d.
117 ) 139 . 3 . 6 ( £1
      117
      ---
       22
        20
      ----
      443 ( 3s.
      351
      ----
       92
       12
      ----
     1110 ( 9d.
     1053
     ----
       57
```

Quotient £1. 3*s*. $9\frac{10}{39}$*d*.

IV.

(1) $$\frac{\pounds 13.\ 17s.\ 1\frac{1}{2}d.}{9} = \pounds 1.\ 10s.\ 9\frac{1}{2}d.$$

(2) $$\frac{\pounds 86.\ 16s.\ 4\frac{3}{4}d.}{11} = \pounds 7.\ 17s.\ 10\frac{1}{4}d.$$

(3) $$\frac{\pounds 8.\ 4s.\ 3d.}{12} = 13s.\ 8\frac{1}{4}d.$$

(4) $$\frac{\pounds 1.\ 9s.}{48} = \frac{7s.\ 3d.}{12} = 7\frac{1}{4}d.$$

(5) $$\frac{\pounds 53.\ 15s.\ 8d.}{112} = \frac{\pounds 13\ 8s.\ 11d.}{28} = \frac{\pounds 3.\ 7s.\ 2\frac{3}{4}d.}{7} = 9s.\ 7\frac{1}{4}d$$

(6) $$\frac{\pounds 14}{240} = \frac{\pounds 3.\ 10s.}{60} = \frac{7s.}{6} = 1s.\ 2d.$$

(7) $$\frac{\pounds 155.\ 7s.\ 6d.}{1320} = \frac{\pounds 15.\ 10s.\ 9d.}{132} = \frac{\pounds 1.\ 5s.\ 10\frac{3}{4}d.}{11} = 2s.\ 4\frac{1}{4}d.$$

Ex. (lxxiii), p. 129.

(1) $\frac{3 \times 4s.\ 9d.}{4} = \frac{14s.\ 3d.}{4} = 3s.\ 6\tfrac{3}{4}d.$

(2) $\frac{5 \times 7s.\ 2d.}{8} = \frac{35s.\ 10d.}{8} = 4s.\ 5\tfrac{3}{4}d.$

(3) $\frac{5 \times 21s.}{16} = \frac{105s.}{16} = \frac{52s.\ 6d.}{8} = 6s.\ 6\tfrac{3}{4}d.$

(4) $\frac{2 \times 3s.\ 6d.}{7} = \frac{7s.}{7} = 1s.$

(5) $\tfrac{1}{2}$ of $\tfrac{3}{4}$ of $4s.\ 10d. = \frac{3 \times 4s.\ 10d.}{8} = \frac{14s.\ 6d.}{8} = 1s.\ 9\tfrac{3}{4}d.$

(6) $\frac{8 \times \pounds 83.\ 16s.\ 3d.}{3 \times 9} = \frac{8 \times \pounds 27.\ 18s.\ 9d.}{9} = 8 \times \pounds 3.\ 2s.\ 1d.$
$= \pounds 24.\ 16s.\ 8d.$

(7) $9\tfrac{1}{3}$ of $1s.\ 1\tfrac{1}{2}d. = \tfrac{28}{3}$ of $13\tfrac{1}{2}d. = 28 \times 4\tfrac{1}{2}d. = 126d. = 10s.\ 6d.$

(8) $\tfrac{88}{15}$ of $30d. = 88 \times 2d. = 176d. = 14s.\ 8d.$

(9) $2\tfrac{3}{5}$ of $\pounds 5.\ 2s.\ 6d. = \tfrac{13}{5}$ of $\pounds 5.\ 2s.\ 6d. = 13 \times \pounds 1.\ 0s.\ 6d.$
$= \pounds 13.\ 6s.\ 6d.$

(10) $\frac{27 \times 1994s.}{56} = \frac{27 \times 997s.}{28} = \frac{26919s.}{28} = 961\tfrac{11}{28}s. = \pounds 48.\ 1s.\ 4\tfrac{5}{7}d.$

(11) $\frac{103 \times 7748d.}{45} = \frac{798044d.}{45} = 17734\tfrac{14}{45}d. = \pounds 73.\ 17s.\ 10\tfrac{14}{45}d.$

(12) $\frac{8 \times 17 \times \pounds 17.\ 7s.\ 6d.}{3 \times 5} = 136 \times \pounds 1.\ 3s.\ 2d. = \pounds 157.\ 10s.\ 8d.$

(13) $\frac{5 \times \pounds 257.\ 2s.\ 3d.}{12} = \frac{\pounds 1285.\ 11s.\ 3d.}{12} = \pounds 107.\ 2s.\ 7\tfrac{1}{4}d.$

(14) $\frac{7 \times \pounds 425.\ 3s.\ 9d.}{15} = \frac{\pounds 2976.\ 6s.\ 3d.}{15} = \pounds 198.\ 8s.\ 5d.$

(15) $\frac{70 \times \pounds 101.\ 17s.\ 5d.}{23} = 70 \times \pounds 4.\ 8s.\ 7d. = \pounds 310.\ 0s.\ 10d.$

(16) $\dfrac{193 \times \pounds 17.\ 7s.\ 7\frac{1}{4}d.}{47} = 193 \times 7s.\ 4\frac{3}{4}d. = \pounds 71.\ 7s.\ 4\frac{3}{4}d.$

(17) $\dfrac{9 \times \pounds 60.\ 1s.\ 8d.}{7} = 9 \times \pounds 8.\ 11s.\ 8d. = \pounds 77.\ 5s.\ 0d.$

(18) $\dfrac{3 \times \pounds 2.\ 6s.\ 9d.}{4} = 3 \times 11s.\ 8\frac{1}{4}d. = \pounds 1.\ 15s.\ 0\frac{3}{4}d.$

(19) $\dfrac{17 \times \pounds 53.\ 15s.\ 8d.}{112} = 17 \times 9s.\ 7\frac{1}{4}d. = \pounds 8.\ 3s.\ 3\frac{1}{4}d.$

(20) $\dfrac{5 \times \pounds 36.\ 2s.\ 9d.}{21} = 5 \times \pounds 1.\ 14s.\ 5d. = \pounds 8.\ 12s.\ 1d.$

Ex. (lxxiv), p. 130.

(1)
$$\begin{array}{rrcrcrl}
 & \pounds & & s. & & d. & \\
 & 245 & . & 13 & . & 4 & \\
 & & & & & 5\frac{3}{4} & \\
\hline
4\,| & 737 & . & 0 & . & 0 & \\
\hline
 & 184 & . & 5 & . & 0 & \text{for } \frac{3}{4} \\
 & 1238 & . & 6 & . & 8 & \text{for } 5 \\
\hline
 & \pounds 1412 & . & 11 & . & 8 & \text{for } 5\frac{3}{4}
\end{array}$$

(2)
$$\begin{array}{rcrcrl}
\pounds & & s. & & d. & \\
439 & . & 18 & . & 3 & \\
 & & & & 7\frac{1}{3} & \\
\hline
146 & . & 12 & . & 9 & \text{for } \frac{1}{3} \\
3079 & . & 7 & . & 9 & \text{for } 7 \\
\hline
\pounds 3226 & . & 0 & . & 6 & \text{for } 7\frac{1}{3}
\end{array}$$

(3)
$$\begin{array}{rrcrcrl}
 & \pounds & & s. & & d. & \\
 & 4214 & . & 15 & . & 2 & \\
 & & & & & 6\frac{5}{7} & \\
\hline
7\,| & 21073 & . & 15 & . & 10 & \\
\hline
 & 3010 & . & 10 & . & 10 & \text{for } \frac{5}{7} \\
 & 25288 & . & 11 & . & 0 & \text{for } 6 \\
\hline
 & \pounds 28299 & . & 1 & . & 10 & \text{for } 6\frac{5}{7}
\end{array}$$

(4)
$$\begin{array}{rrcrcrl}
 & \pounds & & s. & & d. & \\
 & 8629 & . & 12 & . & 8 & \\
 & & & & & 3\frac{5}{8} & \\
\hline
8\,| & 43148 & . & 3 & . & 4 & \\
\hline
 & 5393 & . & 10 & . & 5 & \text{for } \frac{5}{8} \\
 & 25888 & . & 18 & . & 0 & \text{for } 3 \\
\hline
 & \pounds 31282 & . & 8 & . & 5 & \text{for } 3\frac{5}{8}
\end{array}$$

(5)
$$\begin{array}{rrcrcrl}
 & \pounds & & s. & & d. & \\
 & 7258 & . & 17 & . & 6 & \\
 & & & & & 2\frac{3}{5} & \\
\hline
5\,| & 21776 & . & 12 & . & 6 & \\
\hline
 & 4355 & . & 6 & . & 6 & \text{for } \frac{3}{5} \\
 & 14517 & . & 15 & . & 0 & \text{for } 2 \\
\hline
 & \pounds 18873 & . & 1 & . & 6 & \text{for } 2\frac{3}{5}
\end{array}$$

(6)
$$\begin{array}{rrcrcrl}
 & \pounds & & s. & & d. & \\
 & 4372 & . & 19 & . & 4 & \\
 & & & & & 6\frac{3}{8} & \\
\hline
8\,| & 13118 & . & 18 & . & 0 & \\
\hline
 & 1639 & . & 17 & . & 3 & \text{for } \frac{3}{8} \\
 & 26237 & . & 16 & . & 0 & \text{for } 6 \\
\hline
 & \pounds 27877 & . & 13 & . & 3 & \text{for } 6\frac{3}{8}
\end{array}$$

Ex. (lxxv), p. 131.

(1)
hr. min. sec.
6 . 17 . 25
60
377 min.
60
22645 sec.

hr. min. sec.
17 . 0 . 43
60
1020
60
61243 sec.

(2)
yr. da. hr.
3 . 143 . 16
365
1238 da.
24
4968
2476
29728 hr.
60
1783680 min.
60
107020800 sec.

yr. da. hr. min.
1 . 13 . 0 . 4
365
378 da.
24
1512
756
9072 hr.
60
544324 min.

(3)
min.
6,0 | 4856,7
24 | 809 . 27 min.
33 da. 17 hr.

sec.
6,0 | 2357,6
6,0 | 39,2 . 56 sec.
6 hr. 32 min.

(4)
sec.
6,0 | 74239,2
6,0 | 1237,3 . 12 sec.
24 | 206 . 13 min.
8 da. 14 hr.

sec.
6,0 | 17429,6
6,0 | 290,4 . 56 sec.
24 | 48 . 24 min.
2 da. 0 hr.

(5) 28 + 31 + 30 + 29 = 118; 27 + 31 + 30 + 31 + 30 + 2 = 151;
28 + 29 + 31 + 30 + 31 + 30 + 31 + 31 + 30 + 15 = 286
5 + 31 + 30 + 31 + 23 = 120; 6 + 31 + 28 + 31 + 30 + 25 = 151

(6) 76 hr. 34 min. 36 sec.
(7) 136 da. 1 hr. 42 min.
(8) 26 wk. 2 da. 2 hr.
(9) 22 yr. 293 da. 1 hr.
(10) 77 hr. 3 min. 41 sec.
(11) 250 da. 23 hr. 1 min. 13 sec.
(12) 2 hr. 54 min. 48 sec.
(13) 83 da. 17 hr. 47 min.
(14) 6 da. 22 hr.
(15) 298 da. 21 hr.
(16) 1 yr. 331 da. 21 hr.
(17) 5 da. 9 hr. 36 min. 46 sec.

(18)

$$\begin{array}{rcrcr} \text{hr.} & & \text{min.} & & \text{sec.}\\ 13 & . & 14 & . & 43\\ &&&&7\\ \hline 92 & . & 43 & . & 1\\ &&&&5\\ \hline 463 & . & 35 & . & 5 \end{array}$$

$$\begin{array}{rcrcrl} \text{hr.} & & \text{min.} & & \text{sec.} & \\ 17 & . & 13 & . & 39 & \\ &&&& 10 & \\ \hline 172 & . & 16 & . & 30 & \text{for } 10\\ &&&& 4 & \\ \hline 689 & . & 6 & . & 0 & \text{for } 40\\ 51 & . & 40 & . & 57 & \text{for } 3\\ \hline 740 & . & 46 & . & 57 & \text{for } 43 \end{array}$$

(19)

$$\begin{array}{r|rcrcrcr} & \text{wk.} & & \text{da.} & & \text{hr.} & & \text{min.}\\ 7 & 15 & . & 5 & . & 17 & . & 26\\ \hline 7 & 2 & . & 1 & . & 19 & . & 38\\ \hline & & & 2 & . & 6 & . & 14 \end{array}$$

$$\begin{array}{rl} & \text{hr.}\ \ \text{min.}\ \ \text{sec.}\\ & 14\ .\ 56\ .\ 41\\ & 60\\ \hline 73\,) & 896\ (\ 12\ \text{min.}\\ & 876\\ \hline & 20\\ & 60\\ \hline 73\,) & 1241\ (\ 17\ \text{sec.}\\ & 1241\\ \hline \end{array}$$

Ex. (lxxvi), p. 133.

(1)

$$\begin{array}{l} \text{yd.} \quad \text{ft.} \\ 3 \;.\; 2 \\ 3 \\ \hline 11 \text{ ft.} \\ 12 \\ \hline 132 \text{ in.} \end{array}$$

$$\begin{array}{l} \text{mi.} \quad \text{fur.} \quad \text{po.} \\ 4 \;.\; 3 \;.\; 4 \\ 8 \\ \hline 35 \text{ fur.} \\ 40 \\ \hline 1404 \text{ po.} \\ 5\frac{1}{2} \\ \hline 702 \\ 7020 \\ \hline 7722 \text{ yd.} \\ 3 \\ \hline 23166 \text{ ft.} \end{array}$$

(2)

$$\begin{array}{l} \text{mi.} \quad \text{po.} \quad \text{yd.} \\ 7 \;.\; 14 \;.\; 3\frac{1}{2} \\ 8 \\ \hline 56 \text{ fur.} \\ 40 \\ \hline 2254 \text{ po.} \\ 5\frac{1}{2} \\ \hline 1127 \\ 11270 \\ 3\frac{1}{2} \\ \hline 12400\frac{1}{2} \text{ yd.} \\ 3 \\ \hline 37201\frac{1}{2} \text{ ft.} \\ 12 \\ \hline 446418 \text{ in.} \end{array}$$

$$\begin{array}{l} \text{po.} \quad \text{yd.} \\ 27 \;.\; 4\frac{1}{4} \\ 5\frac{1}{2} \\ \hline 13\frac{1}{2} \\ 135 \\ 4\frac{1}{4} \\ \hline 152\frac{3}{4} \text{ yd.} \\ 3 \\ \hline 458\frac{1}{4} \text{ ft.} \\ 12 \\ \hline 5499 \text{ in.} \end{array}$$

(3) yd.
74325
2
11 | 148650
13513 po. . 3½ yd.

in.
12 | 2423694
3 | 201974 . 6 in.
67324 . 2 ft.
2
11 | 134648
4,0 | 1224,0 . 4 yd.
306 fur. 0 po.

(4) ft.
3 | 723964
241321 . 1 ft.
2
11 | 482642
4,0 | 4387,6 . 3 yd.
8 | 1096 . 36 po.
137 mi.

in.
12 | 82976432
3 | 6914702 . 8 in.
2304900 . 2 ft.
2
11 | 4609800
4,0 | 41907,2 . 4 yd.
8 | 10476 . 32 po.
1309 mi. . 4 fur.

(5) 107 yd. 1 ft. 8 in.

(6) 154 mi. 2 fur. 20 po.

(7) 23 fur. 21 po. 4½ yd.

(8) 75 yd. 8 in.

(9) 50 mi. 2 fur. 35 po.

(10) 35 po. 3 yd.

(11) yd. ft. in.
7 . 2 . 9
11
87 . 0 . 3

mi. fur. po.
16 . 5 . 7
7
116 . 4 . 9
8
932 . 1 . 32

(12)

$$\begin{array}{rrrl}
\text{po.} & \text{yd.} & \text{ft.} & \\
32\ . & 3\ . & 1 & \\
 & & 9 & \\ \hline
293\ . & 2\frac{1}{2}. & 0 & \text{for } 9 \\
 & & 6 & \\ \hline
1760\ . & 4\ . & 0 & \text{for } 54 \\
97\ . & 4\frac{1}{2}. & 0 & \text{for } 3 \\ \hline
1858\ . & 3\ . & 0 &
\end{array}$$

$$\begin{array}{rrrr}
\text{mi.} & \text{fur.} & \text{po.} & \text{yd.} \\
36\ . & 3\ . & 6\ . & 3\frac{1}{2} \\
 & & & 7 \\ \hline
254\ . & 6\ . & 6\ . & 2\frac{1}{2} \\
 & & & 7 \\ \hline
1783\ . & 3\ . & 5\ . & 1
\end{array}$$

(13)

$$\begin{array}{r|rrr}
 & \text{yd.} & \text{ft.} & \text{in.} \\
4 & 25\ . & 1\ . & 8 \\ \cline{2-4}
 & 6\ . & 1\ . & 2
\end{array}$$

$$\begin{array}{r|rrr}
 & \text{mi.} & \text{fur.} & \text{po.} \\
3 & 17\ . & 3\ . & 7 \\ \cline{2-4}
9 & 5\ . & 6\ . & 15\frac{2}{3} \\ \cline{2-4}
 & & 5\ . & 6\frac{5}{27}
\end{array}$$

(14)

$$\begin{array}{r|rrrr}
 & \text{po.} & \text{yd.} & \text{ft.} & \text{in.} \\
4 & 14\ . & 2\ . & 1\ . & 8 \\ \cline{2-5}
8 & 3\ . & 3\ . & 1\ . & 2 \\ \cline{2-5}
 & & 2\ . & 1\ . & 5\frac{1}{2}
\end{array}$$

$$\begin{array}{r|rrr}
 & \text{mi.} & \text{fur.} & \text{po.} \\
5 & 11\ . & 7\ . & 7 \\ \cline{2-4}
11 & 2\ . & 3\ . & 1\frac{2}{5} \\ \cline{2-4}
 & & 1\ . & 29\frac{12}{55}
\end{array}$$

Ex. (lxxvii), p. 136.

(1)

$$\begin{array}{rrrrrr}
\text{ac.} & \text{ro.} & \text{po.} & \text{sq. yd.} & \text{sq. ft.} & \text{sq. in.} \\
5\ . & 3\ . & 17\ . & 13\ . & 6\ . & 15
\end{array}$$

$$\begin{array}{rl}
4 & \\ \hline
23 & \text{ro.} \\
40 & \\ \hline
937 & \text{po.} \\
30\frac{1}{4} & \\ \hline
234\frac{1}{4} & \\
28123\ \ & \\ \hline
28357\frac{1}{4} & \text{sq. yd.} \\
9\ \ & \\ \hline
255221\frac{1}{4} & \text{sq. ft.} \\
144\ \ & \\ \hline
1020899\ \ & \\
1020884\ \ \ \ & \\
255221\ \ \ \ \ \ & \\
36\ \ & \\ \hline
36751875\ \ & \text{sq. in.}
\end{array}$$

(2)

$$\begin{array}{rrrr}
\text{ac.} & \text{po.} & \text{sq.yd.} & \text{sq.ft.} \\
7\ . & 13\ . & 5\ . & 3
\end{array}$$

$$\begin{array}{rl}
4 & \\ \hline
28 & \text{ro.} \\
40 & \\ \hline
1133 & \text{po.} \\
30\frac{1}{4} & \\ \hline
283\frac{1}{4} & \\
33995\ \ & \\ \hline
34278\frac{1}{4} & \text{sq. yd.} \\
9\ \ & \\ \hline
308507\frac{1}{4} & \text{sq. ft.} \\
144\ \ & \\ \hline
1234028\ \ & \\
1234028\ \ \ \ & \\
308507\ \ \ \ \ \ & \\
36\ \ & \\ \hline
44425044\ \ & \text{sq. in.}
\end{array}$$

(3) 250 × 4840 sq. yd. = 1210000 sq. yd.;
73 × 9 × 144 sq. in. = 94608 sq. in.

(4)

$$\begin{array}{l}
\begin{array}{r|l} & \text{sq. in.}\\ 12 & 5239\\ \hline \end{array}\\
\left.\begin{array}{r|l} 12 & 436\;.\;7\\ \hline 9 & 36\;.\;48\\ \hline \end{array}\right\}55\text{ sq. in.}\\
\qquad 4\text{ sq. yd.}
\end{array}$$

$$\begin{array}{l}
\begin{array}{r|l} & \text{sq. yd.}\\ & 15376\\ & \qquad 4\\ \hline 11 & 61504\\ \hline \end{array}\\
\left.\begin{array}{r|l} 11 & 5591\;.\;3\\ \hline 4{,}0 & 50{,}8\;.\;33\\ \hline \end{array}\right\}9\text{ sq. yd.}\\
\begin{array}{r|l} 4 & 12\;\;.\;28\text{ po.}\\ \hline \end{array}\\
\qquad 3\text{ ac.}
\end{array}$$

(5)

$$\begin{array}{l}
\begin{array}{r|l} & \text{sq. yd.}\\ & 34729\\ & \qquad 4\\ \hline 11 & 138916\\ \hline \end{array}\\
\left.\begin{array}{r|l} 11 & 12628\;.\;8\\ \hline & 1148\text{ po.}\,0 \end{array}\right\}2\text{ sq. yd.}
\end{array}$$

NOTE.—To avoid fractions, the ½ sq. yd. may be reduced to 4 sq. ft. 72 sq. in., so that the answers to the second example can be put in the form:
14 po. 10 sq. yd. 7 sq. ft.
110 sq. in.

$$\begin{array}{l}
\begin{array}{r|l} & \text{sq. in.}\\ 12 & 562934\\ \hline \end{array}\\
\left.\begin{array}{r|l} 12 & 46911\;.\;2\\ \hline 9 & 3909\;.\;36\\ \hline \end{array}\right\}38\text{ sq. in.}\\
\begin{array}{r|l} & 434\;.\;3\text{ sq. ft.}\\ & \quad 4\\ \hline 11 & 1736\\ \hline \end{array}\\
\left.\begin{array}{r|l} 11 & 157\;.\;9\\ \hline & 14\text{ po.}\,33 \end{array}\right\}10\tfrac{1}{2}\text{ sq. yd.}
\end{array}$$

(6) 284 ac. 2 ro. 25 po. (7) 163 sq. yd. 7 sq. ft. 91 sq. in.

(8) 112 ac. 3 ro. 33 po. 15¼ sq. yd.

(9) 1158 ac. 3 ro. 27 po. (10) 1686 ac. 1 ro. 30 po.

(11) 4760 ac. 0 ro. 28 po. (12) 27 ac. 2 ro. 36 po.

(13) 5 sq. yd. 8 sq. ft. 129 sq. in. (14) 1 ac. 2 ro. 16 po.

(15) 3 ac. 1 ro. 30 po. (16) 6 sq. yd. 7 sq. ft. 22 sq. in.

(17) 66 ac. 3 ro. 36 po.

(18)
ac. ro. po.
5 . 3 . 24
5
29 . 2 . 0
3
88 . 2 . 0

ac. ro. po.
17 . 2 . 13
10
175 . 3 . 10 for 10.
5
879 . 0 . 10 for 50
52 . 2 . 39 for 3
931 . 3 . 9 for 53

(19)
ac. ro. po.
3 | 7 . 2 . 18
7 | 2 . 2 . 6
1 . 18

ac. ro. po.
29 . 2 . 37
4
71) 118 (1 ro.
71
47
40
1917 (27 po.
142
497
497

Ex. (lxxviii), p. 137.

(1)
cub.yd. cub.ft.
7 . 13
27
202 cub. ft.

cub.yd. cub.ft. cub.in.
25 . 5 . 143
27
180
50
680 cub. ft.
1728
138383
10368
1175183 cub. in.

cub. yd. cub. in.
14 . 1374
27
98
28
378
1728
4398
756
2646
378
654558 cub. in.

(2)
$$\begin{array}{r|l} & \text{cub. in.} \\ 12 & 74325 \\ \hline 12 & 6193 \;.\; 9 \\ \hline 12 & 516 \;.\; 12 \\ \hline & 43 \text{ cub. ft.} \end{array} \left.\begin{array}{l} \\ \\ \\ \\ \end{array}\right\} \begin{array}{l}\text{cub. in.} \\ 21\end{array} \qquad \begin{array}{r|l} 12 & 439284 \\ \hline 12 & 36607 \\ \hline 12 & 3050 \;.\; 84 \\ \hline 27 & 254 \;.\; 288 \\ \hline & 9 \text{ cub. yd. . } 11 \text{ cub. ft.} \end{array} \left.\begin{array}{l} \\ \\ \\ \\ \end{array}\right\} \begin{array}{l}\text{cub. in.} \\ 372\end{array}$$

(3) $5\frac{1}{4} \times 27 \times 1728$ cub. in. $= 21 \times 27 \times 432$ cub. in.
$= 244944$ cub. in.
$86\frac{3}{4} \times 1728$ cub. in. $= 347 \times 432$ cub. in. $= 149904$ cub. in.

(4) 270 cub. yd. 26 cub. ft. 1143 cub. in.

(5) 195 cub. yd. 3 cub. ft. 298 cub. in.

(6) 3558 cub. yd. 10 cub. ft. 284 cub. in.

(7) 8 cub. yd. 20 cub. ft. 1545 cub. in.

(8) 8 cub. yd. 1634 cub. in.

(9) 27 cub. yd. 7 cub. ft. 1472 cub. in.

(10)
$$\begin{array}{rcrcr} \text{cub.yd.} & & \text{cub.ft.} & & \text{cub.in.} \\ 26 & . & 5 & . & 49 \\ & & & & 3 \\ \hline 78 & . & 15 & . & 147 \\ & & & & 9 \\ \hline 707 & . & 0 & . & 1323 \end{array} \qquad \begin{array}{rcrcrl} \text{cub.yd.} & & \text{cub.ft.} & & \text{cub. in.} & \\ 472 & . & 17 & . & 238 & \\ & & & & 10 & \\ \hline 4726 & . & 9 & . & 652 & \text{for } 10 \\ & & & & 5 & \\ \hline 23631 & . & 19 & . & 1532 & \text{for } 50 \\ 1417 & . & 24 & . & 714 & \text{for } 3 \\ \hline 25049 & . & 17 & . & 518 & \text{for } 53 \end{array}$$

(11)
$$\begin{array}{r|rcrcr} & \text{cub.yd.} & & \text{cub.ft.} & & \text{cub. in.} \\ 12 & 78 & . & 13 & . & 252 \\ \hline & 6 & . & 14 & . & 1029 \end{array} \qquad \begin{array}{r|rcrcr} & \text{cub.yd.} & & \text{cub.ft.} & & \text{cub. in.} \\ 59 & 472 & . & 0 & . & 1416 \\ \hline & 8 & . & 0 & . & 24 \end{array}$$

Ex. (lxxix), p. 138.

(1)

$$\begin{array}{l} \text{pk. gall. pt.} \\ 3 \;.\; 1 \;.\; 3 \\ 2 \\ \hline 7 \text{ gall.} \\ 8 \\ \hline 59 \text{ pt.} \end{array} \qquad \begin{array}{l} \text{qr. bus. pk.} \\ 214 \;.\; 3 \;.\; 2 \\ 8 \\ \hline 1715 \text{ bus.} \\ 4 \\ \hline 6862 \text{ pk.} \\ 2 \\ \hline 13724 \text{ gall.} \\ 8 \\ \hline 109792 \text{ pt.} \end{array}$$

(2)

$$\begin{array}{r|l} & \text{pt.} \\ 8 & 4234 \\ \hline 2 & 529 \;.\; 2 \text{ pt.} \\ \hline 4 & 264 \;.\; 1 \text{ gall.} \\ \hline 8 & 66 \\ \hline & 8 \text{ qr. } 2 \text{ bus.} \end{array} \qquad \begin{array}{r|l} & \text{gall.} \\ 2 & 3047 \\ \hline 4 & 1523 \;.\; 1 \text{ gall.} \\ \hline 8 & 380 \;.\; 3 \text{ pk.} \\ \hline & 47 \text{ qr. } 4 \text{ bus.} \end{array}$$

(3) 41 gall. 1 pt. (4) 20 bus. 1 pk. 1 gall. (5) 197 qr. 3 bus.

(6) 2 qt. 1 pt. (7) 3 pk. 1 gall. (8) 6 qr. 7 bus. 3 pk.

(9)

$$\begin{array}{r} \text{qr. bus. pk.} \\ 5 \;.\; 3 \;.\; 2 \\ 7 \\ \hline 38 \;.\; 0 \;.\; 2 \\ 9 \\ \hline 342 \;.\; 4 \;.\; 2 \end{array} \qquad \begin{array}{rl} \text{qr. bus. pk.} & \\ 15 \;.\; 2 \;.\; 1 & \\ 10 & \\ \hline 152 \;.\; 6 \;.\; 2 & \text{for } 10 \\ 7 & \\ \hline 1069 \;.\; 5 \;.\; 2 & \text{for } 70 \\ 45 \;.\; 6 \;.\; 3 & \text{for } 3 \\ \hline 1115 \;.\; 4 \;.\; 1 & \text{for } 73 \end{array}$$

(10)

$$\begin{array}{r|l} & \text{gall. pt.} \\ 3 & 13 . 1 \\ \hline 5 & 4 . 3 \\ \hline & \quad\;\; 7 \end{array}
\qquad
\begin{array}{rl} & \text{qr. bus. pk.} \\ 43) & 348 . 0 . 1 \,(8 \text{ qr.} \\ & 344 \\ \hline & \;\;\; 4 \\ & \;\;\; 8 \\ \hline & 32 \text{ bus.} \\ & \;\;\; 4 \\ \hline & 129 \,(3 \text{ pk.} \\ & 129 \\ \hline \end{array}$$

Ex. (lxxx), p. 139.

(1) 27 oz. = 540 dwt. = 12960 gr.

(2) 7 lb. = 84 oz. = 1680 dwt.
14 lb. 3 oz. = 171 oz. = 3420 dwt.
25 lb. 9 oz. 5 dwt. = 309 oz. 5 dwt. = 6185 dwt.

(3)

$$\begin{array}{r} \text{lb. oz. dwt. gr.} \\ 3 . 10 . 7 . 5 \\ 12 \\ \hline 46 \text{ oz.} \\ 20 \\ \hline 927 \text{ dwt.} \\ 24 \\ \hline 3713 \\ 1854 \\ \hline 22253 \text{ gr.} \end{array}
\qquad
\begin{array}{r} \text{lb. oz. dwt. gr.} \\ 7 . 4 . 17 . 15 \\ 12 \\ \hline 88 \text{ oz.} \\ 20 \\ \hline 1777 \text{ dwt.} \\ 24 \\ \hline 7123 \\ 3554 \\ \hline 42663 \text{ gr.} \end{array}$$

(4)

$$\begin{array}{r|l} & \text{gr.} \\ 12 & 3145 \\ \hline 2 & 262 . 1 \text{ gr.} \\ \hline 2{,}0 & 13{,}1 \\ \hline & 6 \text{ oz. . } 11 \text{ dwt.} \end{array}
\qquad
\begin{array}{r|l} & \text{gr.} \\ 12 & 42672 \\ \hline 2 & 3556 \\ \hline 2{,}0 & 177{,}8 \\ \hline 12 & 88 \; . \; 18 \text{ dwt.} \\ \hline & 7 \text{ lb. } 4 \text{ oz.} \end{array}$$

```
          gr.                                  dwt.
(5)  12 | 72469                          2,0 | 324,6
        |--------                            |--------
      2 | 6039 . 1  }                     12 | 162 . 6 dwt.
        |---------- } 13 gr.                 |--------
    2,0 | 301,9 . 12}                          13 lb. 6 oz.
        |----------
     12 | 150  . 19 dwt.
        |----------
          12 lb. 6 oz.
```

(6) 74 lb. 7 oz. (7) 30 oz. 4 dwt. 9 gr.

(8) 87 lb. 7 oz. 12 dwt. 18 gr. (9) 3 oz. 4 dwt. 21 gr.

(10) 7 lb. 9 oz. 13 dwt. (11) 9 oz. 12 dwt. 23 gr.

```
       lb.  oz.  dwt.            lb.  oz.  dwt.
(12)   7  .  5 .  9              6  .  8  .  19
                 12                           3
      -----------              ---------------
      89  .  5 .  8              20 .  2  .  17
                                              7
                               ---------------
                                141 .  7  .  19
```

```
      oz.   dwt.   gr.                 lb.  oz.  dwt.  gr.
(13)  10  .  16  .  23                  3 .  7 . 10 . 21
                     4                                 4
     -----------------                 -----------------
      43  .   7  .  20 for 4           14 .  6 .  3 . 12 for 4
                     9                                10
     -----------------                 -----------------
     390  .   9  .  36 for 36         145 .  1 . 15 .  0 for 40
      10  .  16  .  23 for 1            3 .  7 . 10 . 21 for 1
     -----------------                 -----------------
     401  .   7  .  11 for 37         148 .  9 .  5 . 21 for 41
```

```
          lb.  oz.  dwt.             lb.  oz.  dwt.  gr.
(14)  8 | 16 .  4 .  16           3 | 7 . 10 . 17 . 7
        |-------------              |-------------------
           2 .  0 .  12           5 | 2 .  7 . 12 . 10⅓
                                    |-------------------
                                        6 .  6 . 11⅔
```

$$\begin{array}{rl} & \text{oz. dwt. gr.} \\ (15) & 9\ .\ 17\ .\ 8 \\ & \underline{20} \\ 37\,) & 197\ (\ 5\ \text{dwt.} \\ & \underline{185} \\ & 12 \\ & \underline{24} \\ & 296\ (\ 8\ \text{gr.} \\ & \underline{296} \end{array}$$

$$\begin{array}{r|l} & \text{lb. oz. dwt. gr.} \\ 9 & 15\ .\ 8\ .\ 9\ .\ 12 \\ \hline 7 & 1\ .\ 8\ .\ 18\ .\ 20 \\ \hline & \quad 2\ .\ 19\ .\ 20 \end{array}$$

Ex. (lxxxi), p. 140.

(1) 11 cwt. = 1232 lb. = 19712 oz.
17 lb. = 272 oz. = 4352 dr.
5 tons = 100 cwt. = 11200 lb.

(2) 6 tons 7 cwt. = 127 cwt. = 14224 lb. = 227584 oz.
15 tons 2 qr. = 300 cwt. 2 qr. = 1202 qr. = 33656 lb.

(3) 3 cwt. 6 lb. 5 oz. = 342 lb. 5 oz. = 5477 oz. = 87632 dr.
3 tons 15 cwt. 7 lb. = 75 cwt. 7 lb. = 8407 lb.

$$(4)\quad \begin{array}{r|l} & \text{oz.} \\ 4 & 4763 \\ \hline 4 & \left.\begin{array}{l} 1190\ .\ 3 \\ \hline 297\ .\ 8 \end{array}\right\}11\ \text{oz.} \\ 4 & \\ \hline 7 & \left.\begin{array}{l} 74\ .\ 1 \\ \hline 10\ .\ 16 \end{array}\right\}17\ \text{lb.} \\ 4 & \\ \hline & 2\ \text{cwt.}\ 2\ \text{qr.} \end{array} \qquad \begin{array}{r|l} & \text{lb.} \\ 4 & 3749 \\ \hline 7 & \left.\begin{array}{l} 937\ .\ 1 \\ \hline 133\ .\ 24 \end{array}\right\}25\ \text{lb.} \\ 4 & \\ \hline 20 & 33\ .\ 1\ \text{qr.} \\ \hline & 1\ \text{ton}\ 13\ \text{cwt.} \end{array}$$

(5)
$$\begin{array}{r|l}
 & \text{oz.} \\
4 & 7432 \\ \hline
4 & 1858 \\ \hline
4 & 464\ .\ 8\ \text{oz.} \\ \hline
7 & 116 \\ \hline
4 & 16\ .\ 16\ \text{lb.} \\ \hline
 & 4\ \text{cwt.}
\end{array}
\qquad
\begin{array}{r|rl}
 & \text{dr.} & \\
4 & 247294 & \\ \hline
4 & 61823\ .\ 2 & \left.\right\} 14\ \text{dr.} \\ \hline
4 & 15455\ .\ 12 & \\ \hline
4 & 3863\ .\ 3 & \left.\right\} 15\ \text{oz.} \\ \hline
4 & 965\ .\ 12 & \\ \hline
7 & 241\ .\ 1 & \left.\right\} 13\ \text{lb.} \\ \hline
4 & 34\ .\ 12 & \\ \hline
 & 8\ \text{cwt.}\ 2\ \text{qr.} &
\end{array}$$

(6) 53 lb. 12 oz. 1 dr. (7) 45 qr. 13 lb. 15 oz.

(8) 88 cwt. 2 qr. 8 lb. (9) 150 tons 10 cwt. 1 qr.

(10) 186 cwt. 1 qr. 26 lb. (11) 1559 tons 9 cwt. 2 qr. 15 lb.

(12) 2 lb. 1 oz. 9 dr. (13) 2 qr. 25 lb. 8 oz.

(14) 1 cwt. 1 qr. 14 lb. (15) 7 tons 19 cwt. 3 qr.

(16) 6 lb. (17) 34 tons 18 cwt. 1 qr. 16 lb.

(18)
$$\begin{array}{rcrcr}
\text{cwt.} & & \text{lb.} & & \text{oz.} \\
17 & . & 23 & . & 14 \\
 & & & & 7 \\ \hline
120 & . & 55 & . & 2
\end{array}
\qquad
\begin{array}{rcr}
\text{cwt.} & & \text{lb.} \\
4 & . & 17 \\
 & & 5 \\ \hline
20 & . & 85 \\
 & & 9 \\ \hline
186 & . & 93
\end{array}$$

(19)
$$\begin{array}{rcrcrl}
\text{cwt.} & & \text{qr.} & & \text{lb.} & \\
6 & . & 3 & . & 5 & \\
 & & & & 4 & \\ \hline
27 & . & 0 & . & 20 & \text{for } 4 \\
 & & & & 5 & \\ \hline
135 & . & 3 & . & 16 & \text{for } 20 \\
20 & . & 1 & . & 15 & \text{for } 3 \\ \hline
156 & . & 1 & . & 3 & \text{for } 23
\end{array}
\qquad
\begin{array}{rcrl}
\text{oz.} & & \text{dr.} & \\
10 & . & 9 & \\
 & & 4 & \\ \hline
42 & . & 4 & \text{for } 4 \\
 & & 9 & \\ \hline
380 & . & 4 & \text{for } 36 \\
10 & . & 9 & \text{for } 1 \\ \hline
390 & . & 13 & \text{for } 37
\end{array}$$

(20)
$$\begin{array}{r|rcrcr} & \text{cwt.} & & \text{qr.} & & \text{lb.} \\ 12 & 14 & . & 2 & . & 8 \\ \hline & 1 & . & 0 & . & 24 \end{array}$$

$$\begin{array}{r|rcrcrcr} & \text{tons.} & & \text{cwt.} & & \text{qr.} & & \text{lb.} \\ 4 & 32 & . & 15 & . & 1 & . & 0 \\ \hline 10 & 8 & . & 3 & . & 3 & . & 7 \\ \hline & & & 16 & . & 1 & . & 14\frac{7}{10} \end{array}$$

(21)
$$\begin{array}{rl} & \text{cwt. qr. lb.} \\ & 16 . 3 . 9 \\ & \underline{4} \\ 65) & 67 \text{ (1 qr.} \\ & \underline{65} \\ & 2 \\ & \underline{28} \\ & 65 \text{ (1 lb.} \\ & \underline{65} \end{array}$$

$$\begin{array}{rl} & \text{tons. cwt. qr. lb.} \\ 17) & 37 . 4 . 3 . 7 \text{ (2 tons.} \\ & \underline{34} \\ & 3 \\ & \underline{20} \\ & 64 \text{ (3 cwt.} \\ & \underline{51} \\ & 13 \\ & \underline{4} \\ & 55 \text{ (3 qr.} \\ & \underline{51} \\ & 4 \\ & \underline{28} \\ & 119 \text{ (7 lb.} \\ & \underline{119} \end{array}$$

Ex. (lxxxii), p. 142.

(1)	$5\frac{1}{4}$*d.*	(2)	4*d.*	(3)	$9\frac{3}{4}$*d.*	(4)	$5\frac{3}{4}$*d.*	(5)	$3\frac{1}{4}$*d.*
(6)	4*s.*	(7)	7*s.*	(8)	12*s.*	(9)	14*s.*	(10)	9*s.*

Ex. (lxxxiii), p. 143.

(1)
$$\begin{array}{r|rcrcr} & \text{cwt.} & & \text{qr.} & & \text{lb.} \\ & 3 & . & 2 & . & 12 \\ & & & & & 3\frac{2}{3} \\ \hline 3 & 6 & . & 4 & . & 24 \\ \hline & 2 & . & 1 & . & 17\frac{1}{3} \\ & 10 & . & 3 & . & 8 \\ \hline & 13 & . & 0 & . & 25\frac{1}{3} \end{array}$$

(2)
$$\begin{array}{rcrcr} \text{lb.} & & \text{oz.} & & \text{dr.} \\ 6 & . & 5 & . & 4 \\ & & & & 2\frac{1}{5} \\ \hline 1 & . & 4 & . & 4 \\ 12 & . & 10 & . & 8 \\ \hline 13 & . & 14 & . & 12 \end{array}$$

$$(3)\quad\begin{array}{rcrcrl}
\text{mi.} & & \text{fur.} & & \text{po.} & \\
4 & . & 3 & . & 10 & \\
 & & & & 2 & \\ \hline
8 & . & 6 & . & 20 & \text{for } 2 \\
 & & & & 9 & \\ \hline
79 & . & 2 & . & 20 & \text{for } 18 \\
 & & 7 & . & 2 & \text{for } \frac{1}{5} \\ \hline
80 & . & 1 & . & 22 &
\end{array}
\qquad
(4)\quad\begin{array}{rcrcrl}
\text{yd.} & & \text{ft.} & & \text{in.} & \\
15 & . & 2 & . & 3 & \\
 & & & & 4 & \\ \hline
63 & . & 0 & . & 0 & \text{for } 4 \\
 & & & & 10 & \\ \hline
630 & . & 0 & . & 0 & \text{for } 40 \\
47 & . & 0 & . & 9 & \text{for } 3 \\
2 & . & 0 & . & 9 & \text{for } \frac{1}{7} \\ \hline
679 & . & 1 & . & 6 &
\end{array}$$

$$(5)\quad\begin{array}{r|rcrcrl}
 & \text{ac.} & & \text{ro.} & & \text{po.} & \\
 & 37 & . & 3 & . & 8 & \\
 & & & & & 4\frac{5}{12} & \\ \hline
12 & 189 & . & 0 & . & 0 & \\ \hline
 & 15 & . & 3 & . & 0 & \text{for } \frac{5}{12} \\
 & 151 & . & 0 & . & 32 & \text{for } 4 \\ \hline
 & 166 & . & 3 & . & 32 &
\end{array}
\qquad
(6)\quad\begin{array}{rcrcrl}
\text{ac.} & & \text{ro.} & & \text{po.} & \\
25 & . & 2 & . & 15 & \\
 & & & & 4 & \\ \hline
102 & . & 1 & . & 20 & \text{for } 4 \\
 & & & & 7 & \\ \hline
716 & . & 2 & . & 20 & \text{for } 28 \\
25 & . & 2 & . & 15 & \text{for } 1 \\
15 & . & 1 & . & 17 & \text{for } \frac{3}{5} \\ \hline
757 & . & 2 & . & 12 &
\end{array}$$

$$(7)\quad\begin{array}{r|rcrcrl}
 & \text{sq. yd.} & & \text{sq. ft.} & & \text{sq. in.} & \\
 & 27 & . & 7 & . & 36 & \\
 & & & & & 2\frac{5}{6} & \\ \hline
6 & 138 & . & 9 & . & 36 & \\ \hline
 & 23 & . & 1 & . & 78 & \text{for } \frac{5}{6} \\
 & 55 & . & 5 & . & 72 & \text{for } 2 \\ \hline
 & 78 & . & 7 & . & 6 &
\end{array}$$

Ex. (lxxxiv), p. 143.

$$(1)\quad\begin{array}{r|rcrcr}
 & \text{cwt.} & & \text{qr.} & & \text{lb.} \\
 & 5 & . & 2 & . & 11 \\
 & & & & & 4 \\ \hline
11 & 22 & . & 1 & . & 16 \\ \hline
 & 2 & . & 0 & . & 4
\end{array}
\qquad
(2)\quad\begin{array}{r|rcrcr}
 & \text{lb.} & & \text{oz.} & & \text{dr.} \\
 & 7 & . & 4 & . & 14 \\
 & & & & & 3 \\ \hline
2 & 21 & . & 14 & . & 10 \\ \hline
17 & 10 & . & 15 & . & 5 \\ \hline
 & & & 10 & . & 5
\end{array}$$

```
       mi.  fur.  po.
(3)     7  .  2  . 12
                   12
      ---------------
53) 87  .  3  .  24 ( 1 mi.
    53
    --
    34
     8
   ---
   275 ( 5 fur.
   265
   ---
    10
    40
   ---
   424 ( 8 po.
   424
   ---
```

```
        yd.  ft.  in.
(4)     17  . 1  . 3
                   2
      --------------
   11 | 34  . 2  . 6
      --------------
        3  .  0  . 6
```

```
       ac.   ro.   po.
(5)    25  .  2  .  12
                     7
      ----------------
31) 179  .  0  .   4 ( 5 ac.
    135
    ---
     24
      4
     --
     96 ( 3 ro.
     93
     --
      3
     40
    ---
    124 ( 4 po.
    124
    ---
```

```
       ac.   ro.   po.
(6)    14  .  3  .   8
                     9
      ----------------
74) 133  .  0  .  32 ( 1 ac.
     74
    ---
     59
      4
    ---
    236 ( 3 ro.
    222
    ---
     14
     40
    ---
    592 ( 8 po.
    592
    ---
```

```
           sq. yd. sq. ft.  sq. in.
(7)          107  .  4  .  132
                             5
            ─────────────────────
      92 ) 537  .  6  .   84 ( 5 sq. yd.
           460
           ───
            77
             9
           ───
           699 ( 7 sq. ft.
           644
           ───
            55
           144
           ───
           804
          720
          ────
          8004 ( 87 sq. in.
          736
          ────
           644
           644
           ───
```

Ex. (lxxxv), p. 144.

(1) $\frac{2}{3}$ of 20*s*. = $\frac{40s.}{3}$ = 13*s*. 4*d*.
$\frac{5}{8}$ of 50*s*. = $\frac{125s.}{4}$ = £1. 11*s*. 3*d*.
$\frac{3}{7}$ of £5. 18*s*. 5*d*. = 3 × (16*s*. 11*d*.) = £2. 10*s*. 9*d*.

(2) $\frac{4}{5}$ of 8 fur. = $\frac{32 \text{ fur.}}{5}$ = 6 fur. 16 po.
$\frac{3}{16}$ of 4 ro. = $\frac{12 \text{ ro.}}{16}$ = $\frac{3\times40 \text{ po.}}{4}$ = 30 po.
$\frac{5}{8}$ of 4 qr. = $\frac{5 \text{ qr.}}{2}$ = 2 qr. 14 lb.

(3) $\frac{14}{5}$ of £54. 9*s*. 8*d*. = 14 × (£10. 17*s*. 11$\frac{1}{5}$*d*.) = £152. 11*s*. 0$\frac{4}{5}$*d*.
$\frac{45}{14}$ of $\frac{21}{2}$*s*. = $\frac{135}{4}$*s*. = £1. 13*s*. 9*d*.
$\frac{2}{3}$ of $\frac{27}{8}$ of 1 mile = $\frac{27}{12}$ mi. = 2 mi. 2 fur.

(4) £$\frac{4\times1\times24\times11\times2470\times21}{5\times7\times19\times8\times20}$ = £$\frac{3\times11\times130\times2}{5\times5}$ = £$\frac{2574}{5}$ = £514. 16*s*.
$\frac{2\times1\times9\times21}{3\times4\times2}$*s*. = $\frac{189}{12}$*s*. = 15*s*. 9*d*.

(5) 12*s.* + 8*d.* + 10*s.* 2$\frac{1}{2}$*d.* = £1. 2*s.* 10$\frac{1}{2}$*d.*

(6) 2*s.* 6*d.* + 2*s.* + 9*s.* = 13*s.* 6*d.*

(7) 4 ac. 1 ro. 10 po. + 4 ac. 3 ro. 2$\frac{1}{2}$ po. + 2 ro. 1 po.
= 9 ac. 2 ro. 13$\frac{1}{2}$ po.

(8) 15 da. + 1 da. 3 hr. + 35 min. = 16 da. 3 hr. 35 min.

(9) 1 fur. 110 yd. + 146 yd. 2 ft. + 1 ft. 1$\frac{1}{2}$ in.
= 2 fur. 37 yd. 1$\frac{1}{2}$ in.

(10) 2 cwt. 0 qr. 7 lb. + 2 cwt. 2 qr. 2 lb. + 3 lb.
= 4 cwt. 2 qr. 12 lb.

Ex. (lxxxvi), p. 146.

(1) 1$\frac{3}{4}$*d.* = 7*q.*, and 6*s.* 8$\frac{1}{2}$*d.* = 322*q.*
∴ fraction = $\frac{7}{322} = \frac{1}{46}$.

(2) £10. 5*s.* 4*d.* = 2464*d.*; and £11. 6*s.* 5*d.* = 2717*d.*
∴ fraction = $\frac{2464}{2717} = \frac{224}{247}$.

(3) 5*s.* 6*d.* = 66*d.*; and a guinea = 252*d.*
∴ fraction = $\frac{66}{252} = \frac{11}{42}$.

(4) 9*s.* 10$\frac{1}{2}$*d.* = 474*q.*; and 13*s.* 2$\frac{1}{4}$*d.* = 633*q.*
∴ fraction = $\frac{474}{633} = \frac{158}{211}$.

(5) 2 da. 3 hr. 5 min. = 3065 min.; and a week = 10080 min.
∴ fraction = $\frac{3065}{10080} = \frac{613}{2016}$.

(6) 2 ro. 20 po. = 100 po.; and an acre = 160 po.
∴ fraction = $\frac{100}{160} = \frac{5}{8}$.

(7) 8 lb. 1 oz. 19 dwt. 9 gr. = 47025 gr.; and
13 lb. 7 oz. 5 dwt. 15 gr. = 78375 gr.
∴ fraction = $\frac{47025}{78375} = \frac{3}{5}$.

(8) 2 qr. 10 lb. 7 oz. 9 dr. = 17017 dr.; and 1 qr. 7 oz. 13 dr. = 7293 dr.

$\therefore$ fraction $= \frac{7293}{17017} = \frac{3}{7}$.

(9) 4 lb. 1 oz. 8 dwt. 15 gr. = 23727 gr.; and 1 lb. 1 oz. 9 dwt. 15 gr. = 6471 gr.

$\therefore$ fraction $= \frac{6471}{23727} = \frac{3}{11}$.

(10) Measure $= \dfrac{2\frac{1}{2}}{2\frac{1}{2} \times 3} = \frac{1}{3}$

(11) Measure $= \dfrac{\frac{5}{374} \times 1760 \times 36}{5} = \frac{1760 \times 36}{374} = \frac{160 \times 18}{17} = \frac{2880}{17}$

(12) 2 ac. 37 po. = 357 po.; and 3 ac. 2 ro. 1 po. = 561 po.

$\therefore$ fraction $= \frac{561}{357} = \frac{187}{119}$.

(13) Fraction $= \dfrac{\frac{3}{8} \text{ of } 1}{21} = \frac{3}{8 \times 21} = \frac{1}{56}$

(14) Fraction $= \dfrac{2\frac{4}{9} \times 4 \times 112}{88} = \frac{22 \times 112}{9 \times 22} = \frac{112}{9}$

(15) Fraction $= \dfrac{\frac{1}{24} \times 36}{1} = \frac{36}{24} = \frac{3}{2}$

(16) Part $= \dfrac{\frac{2}{3} \times 20}{21} = \frac{2 \times 20}{3 \times 21} = \frac{40}{63}$

(17) Part $= \dfrac{\frac{2}{5} \times 1}{8} = \frac{2}{5 \times 8} = \frac{1}{20}$

(18) Fraction $= \dfrac{\frac{2}{3} \times 1298}{2 \times 1760 \times 36} = \frac{1298}{3 \times 1760 \times 36} = \frac{118}{3 \times 160 \times 36} = \frac{59}{8640}$

(19) Part $= \dfrac{2\frac{4}{5} \times 4\frac{2}{7} \times 5}{67 \times 2} = \frac{14 \times 30 \times 5}{5 \times 7 \times 67 \times 2} = \frac{30}{67}$

(20) Fraction $= \dfrac{\frac{3}{5}\times 1682}{\frac{2}{3}\times 66\times 20} = \dfrac{3\times 1682}{5\times 2\times 22\times 20} = \dfrac{2523}{2200}$

(21) Fraction $= \dfrac{\frac{5}{12}\times 21}{\frac{12}{5}\times 5} = \dfrac{5\times 21}{12\times 12} = \dfrac{35}{48}$

Ex. (lxxxvii), p. 148.

(1)
$$\begin{array}{r} £\ \cdot 625 \\ 20 \\ \hline s.\ 12\cdot 500 \\ 12 \\ \hline d.\ 6\cdot 000 \end{array}$$

(2)
$$\begin{array}{r} £\ 15\cdot 275 \\ 20 \\ \hline s.\ 5\cdot 500 \\ 12 \\ \hline d.\ 6\cdot 000 \end{array}$$

(3)
$$\begin{array}{r} £\ \cdot 009765 \\ 20 \\ \hline s.\ \cdot 195300 \\ 12 \\ \hline d.\ 2\cdot 343600 \end{array}$$

(4)
$$\begin{array}{r} \text{cwt. } \cdot 9375 \\ 4 \\ \hline \text{qr. } 3\cdot 7500 \\ 28 \\ \hline 60000 \\ 15000 \\ \hline \text{lb. } 21\cdot 0000 \end{array}$$

(5)
$$\begin{array}{r} \text{lb. } \cdot 046875 \\ 16 \\ \hline 281250 \\ 46875 \\ \hline \text{oz. } \cdot 750000 \\ 16 \\ \hline \text{dr. } 12\cdot 000000 \end{array}$$

(6)
$$\begin{array}{r} £\ 2\cdot 003125 \\ 8 \\ \hline £\ 16\cdot 025000 \\ 20 \\ \hline s.\ \ \cdot 500000 \\ 12 \\ \hline d.\ 6\cdot 000000 \end{array}$$

(7)
$$\begin{array}{r} d.\ \cdot 425 \\ 40 \\ \hline d.\ 17\cdot 000 \end{array}$$

(8)
$$\begin{array}{r} s.\ 2\cdot 46875 \\ 23 \\ \hline 740625 \\ 493750 \\ \hline s.\ 56\cdot 78125 \\ 12 \\ \hline d.\ 9\cdot 37500 \end{array}$$

(9) $\frac{83-8}{90}$ of 5*s.* $= \frac{75\times 5}{90}$*s.* $= \frac{25}{6}$*s.* = 4*s.* 2*d.*

(10) $\frac{413-41}{90}$ of 147*d.* $= \frac{372\times 147}{90}$*d.* $= \frac{124\times 49}{10}$*d.* = 607·6*d.*
= £2. 10*s.* 7·6*d.*

(11)
$$\begin{array}{r} \text{lb. } \cdot 35 \\ 70 \\ \hline \text{lb. } 24\cdot 50 \\ 16 \\ \hline \text{oz. } 8\cdot 00 \end{array}$$

(12)
$$\begin{array}{r} \text{gui. } 2\cdot 125 \\ 3\cdot 5 \\ \hline 10625 \\ 6375 \\ \hline \text{gui. } 7\cdot 4375 \\ 21 \\ \hline 4375 \\ 8750 \\ \hline s.\ 9\cdot 1875 \\ 12 \\ \hline d.\ 2\cdot 2500 \\ 4 \\ \hline q.\ 1\cdot 0000 \end{array}$$

(13)
$$\begin{array}{r} \text{cwt. } 2\cdot 1372 \\ 45 \\ \hline 106860 \\ 85488 \\ \hline \text{cwt. } 96\cdot 1740 \\ 4 \\ \hline \text{qr. } \cdot 6960 \\ 28 \\ \hline 55680 \\ 13920 \\ \hline \text{lb. } 19\cdot 4880 \end{array}$$

(14) $\frac{5247-524}{900}$ of $1230d. = \frac{4723\times 1230}{900}d. = \frac{4723\times 41}{30}d.$
$= £26.\ 17s.\ 10\frac{23}{30}d.$

(15)
$$\begin{array}{r} £\ \cdot 45 \\ 3\cdot 5 \\ \hline 225 \\ 135 \\ \hline £\ 1\cdot 575 \\ 20 \\ \hline s.\ 11\cdot 500 \\ 12 \\ \hline d.\ 6\cdot 000 \end{array}
\qquad
\begin{array}{r} d.\ \cdot 75 \\ 56 \\ \hline 450 \\ 375 \\ \hline d.\ 42\cdot 00 \end{array}
\qquad
\begin{array}{r} d.\ 3\cdot 245 \\ 40 \\ \hline d.\ 129\cdot 800 \end{array}$$

∴ £1. 11*s.* 6*d.* + 3*s.* 6*d.* + 10*s.* 9·8*d.*
= £2. 5*s.* 9·8*d.*

(16) £·7 = 14*s.*; $\cdot\dot{8}$ of 7*s.* 6*d.* = $\frac{8}{9}$ of 90*d.* = 6*s.* 8*d.*
2·45 of 20*d.* = 49·00*d.* = 4*s.* 1*d.*
∴ 14*s.* + 6*s.* 8*d.* − 4*s.* 1*d.* = 16*s.* 7*d.*

(17) $\cdot\dot{2}8571\dot{4}$ of 63*s*. = $\frac{285714}{999999}$ of 63*s*. = $\frac{2}{7}$ of 63*s*. = 18*s*.
$\cdot\dot{1}4285\dot{7}$ of 77*s*. = $\frac{142857}{999999}$ of 77*s*. = $\frac{1}{7}$ of 77*s*. = 11*s*.
$\cdot\dot{3}\dot{4}$ of 16*s*. 6*d*. = $\frac{34}{99}$ of 198*d*. = 34 × 2*d*. = 5*s*. 8*d*.
∴ 18*s*. + 11*s*. + 5*s*. 8*d*. = £1. 14*s*. 8*d*.

Ex. (lxxxviii), p. 150.

(1)
$$\begin{array}{r|l} 4 & 3\cdot00 \\ \hline 12 & 3\cdot7500 \\ \hline 20 & 16\cdot312500 \\ \hline & \cdot815625 \end{array}$$

(2)
$$\begin{array}{r|l} 12 & 4\cdot0 \\ \hline 6 & 35\cdot\dot{3} \\ \hline 7 & 5\cdot\dot{8} \\ \hline & \cdot\dot{8}4126\dot{9} \end{array}$$

(3)
$$\begin{array}{r|l} 4 & 1\cdot \\ \hline 12 & \cdot25 \\ \hline 60 & 8\cdot0208\dot{3} \\ \hline & \cdot133680\dot{5} \end{array}$$

(4) £1. 2*s*. 3$\frac{1}{4}$*d*. = 1069*q*., and £17. 16*s*. 4*d*. = 17104*q*.
∴ $\frac{1069}{17104} = \frac{1}{16} = \cdot0625$.

(5)
$$\begin{array}{r|l} 4 & 3\cdot0 \\ \hline 12 & 9\cdot75 \\ \hline 40 & 11\cdot8125 \\ \hline & \cdot2953125 \end{array}$$

(6) $\frac{2}{3}$ of £4. 6*s*. 9*d*. = 694*d*.; and £2. 10*s*. = 600*d*.
∴ $\frac{694}{600} = \frac{6\cdot94}{6} = 1\cdot15\dot{6}$.

(7) $\frac{2}{9} \div 160 = \frac{1}{720} = \frac{\cdot0125}{9} = \cdot0013\dot{8}$.

(8) 5 po. 4 yd. 2$\frac{1}{2}$ ft. = 97 ft., and 1 furlong = 660 ft.
∴ $\frac{97}{660} = \frac{9\cdot7}{66} = \frac{1\cdot61\dot{6}}{11} = \cdot14\dot{6}\dot{9}$.

(9) 3 qr. 3 lb. 1 oz. 12$\frac{4}{9}$ dr. = 22300$\frac{4}{9}$ dr. = $\frac{190704}{9}$ dr.
1 cwt. = 4 × 28 × 16 × 16 dr.
∴ $\frac{190704}{9\times4\times28\times16\times16} = \frac{7}{9} = \cdot\dot{7}$.

(10)
$$\begin{array}{r|l} 60 & 6\cdot \\ \hline 60 & 14\cdot1 \\ \hline 4 & 15\cdot235 \\ \hline 12 & 3\cdot80875 \\ \hline & \cdot3173958\dot{3} \end{array}$$

(11)
$$\begin{array}{r|l} 4 & 7\cdot \\ \hline 7 & 1\cdot75 \\ \hline 4 & 2\cdot25 \\ \hline 20 & 6\cdot5625 \\ \hline & \cdot328125 \end{array}$$

(12) $\frac{12}{12\times20\times24} = \frac{1}{20\times24} = \frac{\cdot05}{24} = \frac{\cdot0125}{6} = \cdot00208\dot{3}$

(13) £1. 19*s*. $4\frac{1}{2}$*d*. = 1890*q*., and 10 guineas = (10 × 21 × 12 × 4)*q*.

$\therefore \frac{1890}{10\times21\times12\times4} = \frac{9}{12\times4} = \frac{3}{16} = \cdot1875$

(14) $\frac{\frac{3}{5}\text{ of }172}{240} = \frac{516}{1200} = \frac{5\cdot16}{12} = \cdot43$

(15) $\frac{3\cdot45\times21}{5} = \cdot69 \times 21 = 14\cdot49$

(16) $\frac{\frac{3}{8}\text{ of }70}{112} = \frac{3\times70}{8\times112} = \frac{15}{64} = \frac{1\cdot875}{8} = \cdot234375$

(17) $\frac{4\frac{2}{5}\text{ of }144}{12\times20} = \frac{22\times12}{5\times20} = \frac{264}{100} = 2\cdot64$

(18) $\frac{3\frac{7}{8}\text{ of }1\frac{1}{4}\text{ of }637}{20\times112} = \frac{31\times5\times91}{8\times4\times20\times16} = \frac{2821}{8\times4\times4\times16} = \frac{352\cdot625}{8\times8\times4}$

$= \frac{88\cdot15625}{8\times8} = \frac{11\cdot01953125}{8} = 1\cdot37744140625$

(19) $\frac{\frac{2}{3}\text{ of }1}{20\times12} = \frac{2}{3\times20\times12} = \frac{1}{3\times10\times12} = \frac{\cdot08\dot{3}}{3\times10} = \cdot002\dot{7}$

(20) $\frac{3\frac{3}{4}\times21}{55} = \frac{15\times21}{4\times55} = \frac{63}{4\times11} = \frac{15\cdot75}{11} = 1\cdot43\dot{1}\dot{8}$

(21) $\frac{5}{\frac{5}{12}\text{ of }40} = \frac{5\times12}{5\times40} = \frac{3}{10} = \cdot3$

(22) $\frac{441}{1000\times480} = \frac{\cdot0441}{48} = \frac{\cdot0147}{16} = \cdot00091875$

(23) £24·25 = 24·25 × 20 × 12*d*. = 5820*d*.

3·4125*s*. = 3·4125 × 12*d*. = 40·95*d*.

$\therefore \frac{5820+40\cdot95+9\cdot25}{10\times240} = \frac{5870\cdot2}{10\times240} = \frac{14\cdot6755}{6} = 2\cdot44591\dot{6}$

(24) $\frac{\frac{43}{99}\text{ of }99}{\frac{1}{90}\text{ of }9\times240} = \frac{43}{24} = \frac{10\cdot75}{6} = 1\cdot791\dot{6}$

(25) $\frac{\frac{4}{90}\text{ of }540 + \frac{23}{99}\text{ of }45}{\frac{245}{999}\text{ of }999} = \frac{24+\frac{115}{11}}{245} = \frac{379}{2695} = \cdot1406\ldots.$

Ex. (lxxxix), p. 151.

(1) £15·125 = 302·5*s.* = 3630*d.*
17·3125*s.* = 207·75*d.*
(3630 + 207·75 + 9·75)*d.* = 3847·5*d.*
$\therefore \frac{3847\cdot5}{25\times20\times12} = \frac{3847\cdot5}{1000\times6} = \frac{3\cdot8475}{6} = \cdot64125$

(2) $\frac{5}{3}$ of the money = 30*d.*
$\therefore$ $\frac{1}{3}$ of the money = 6*d.*
$\therefore$ the money = 1*s.* 6*d.*

(3) Decimal = $\frac{28}{112} = \frac{1}{4} = \cdot25$
£6·944 = $\frac{6\cdot944\times20\times12}{28}$ rupees = (·992 × 20 × 3) rupees
= 59·52 rupees.

(4) $\frac{13}{23}$ of the money = 1235*d.*
$\therefore$ $\frac{1}{23}$ of the money = $\frac{1235}{13}$*d.* = 95*d.*
$\therefore$ the money = (23 × 95)*d.* = 2185*d.* = £9. 2*s.* 1*d.*

(5)
$$\begin{array}{rrr}
\text{£}\ \cdot55 & \text{£}\ \cdot34875 & \text{£}\ 5\cdot46875 \\
3 & 10 & 3 \\ \hline
\text{£}\ 1\cdot65 & \text{£}\ 3\cdot4875 & \text{£}\ 16\cdot40625 \\
20 & 20 & 20 \\ \hline
s.\ 13\cdot00 & s.\ 9\cdot7500 & s.\ 8\cdot12500 \\
 & 12 & 12 \\ \cline{2-3}
 & d.\ 9\cdot0000 & d.\ 1\cdot50000 \\
 & & 4 \\ \cline{3-3}
 & & q.\ 2\cdot00000
\end{array}$$

$\therefore$ £1. 13*s.* + £3. 9*s.* 9*d.* + £16. 8*s.* 1$\frac{1}{2}$*d.* = £21. 10*s.* 10$\frac{1}{2}$*d.*

(6) $\frac{4}{5}$ of (12 × 20)*s.* − $\frac{5}{6}$ of (3 × 21)*s.* = 192*s.* − 52$\frac{1}{2}$*s.* = 139$\frac{1}{2}$*s.*
$\therefore \frac{139\frac{1}{2}}{5} = \frac{279}{2\times5} = \frac{279}{10}$

(7) $\frac{82\frac{3}{5}}{16\times16} = \frac{413}{5\times16\times16} = \frac{51\cdot625}{10\times16} = \frac{1\cdot290625}{4} = \cdot32265625$

(8) $\frac{\frac{13}{4}}{\frac{21}{5}}$ of 525*s*. $= \frac{13\times5\times525}{4\times21}$*s*. $= \frac{13\times5\times25}{4}$*s*. $= \pounds20$. 6*s*. 3*d*.

(9) $\frac{\frac{3}{7}\text{ of }556}{1760\times36} = \frac{139}{7\times1760\times3} = \frac{139}{36960}$

(10) $\frac{1}{4}$ of 17*s* 8*d*. = 53*d*.; 2·625 of 1*s*. = 31·5*d*.;
$\frac{3}{4}$ of $\frac{5}{8}$ of 64*d*. = 30*d*.; $\frac{263-26}{900}$ of 300*d*. = 79*d*.
$\therefore \frac{53+31\cdot5-30+79}{5\times240} = \frac{133\cdot5}{1200} = \cdot11125$

(11) £1. 4*s*. 10$\frac{3}{4}$*d*. = 1195*q*., and £3. 19*s*. 8*d*. = 3824*q*.
$\therefore \frac{1195}{3824} = \cdot3125$.

(12) $\cdot4097\dot{2}$ of 3*s*. $= \frac{40972-4097}{90000}$ of 3*s*. $= \frac{36875\times3}{90000}$*s*.
$\cdot2\dot{7}$ of 8*s*. $= \frac{27-2}{90}$ of 8*s*. $= \frac{25\times8}{90}$*s*. $= \frac{20}{9}$*s*.
$\therefore \frac{110625+2000000}{90000} \times \frac{1}{20} = \frac{310625}{1800000} = \frac{1\cdot553125}{9}$
$= \cdot172569\dot{4}$.

(13) $1\cdot3\dot{2}\dot{7}$ of 308 days $= \frac{1327-13}{990}$ of 308 days $= \frac{1314\times308}{990\times365}$ yr.
$= \frac{28}{25}$ yr.
$1\cdot\dot{2}$ of a year $= \frac{12-1}{9}$ of a year $= \frac{11}{9}$ yr.
$\therefore \left(\frac{11}{9} - \frac{28}{25}\right) \div \frac{1}{2} = \frac{46}{225} = \frac{184}{900} = \cdot20\dot{4}$.

(14) $\cdot42708\dot{3}$ of £1 $= \pounds\frac{427083-42708}{900000} = \frac{384375}{900000} = \pounds\frac{41}{96}$.
$\cdot23\dot{4}\dot{5}$ of $\pounds6\frac{7}{8} = \pounds\frac{2322\times55}{9900\times8} = \pounds\frac{129}{80}$.
$\therefore \left(\frac{129}{80} - \frac{41}{96}\right) \times \frac{1}{5} = \frac{774-205}{480\times5} = \frac{569}{2400} = \frac{2\cdot845}{12}$
$= \cdot23708\dot{3}$.

(15) $\frac{3}{28}$ of $\frac{7}{8}$ of £1 $= \pounds\frac{3}{32}$.
$\cdot99791\dot{6}$ of £1 $= \pounds\frac{898125}{900000} = \pounds\frac{479}{480}$.
$\therefore \left(\frac{3}{32} + \frac{479}{480}\right) \times \frac{1}{5} = \frac{45+479}{480\times5} = \frac{524}{2400} = \frac{2\cdot62}{12} = \cdot218\dot{3}$.

(16) $\frac{4\times8\times11\times247\times21\times12}{5\times7\times19\times4}$*d*. $= \frac{8\times11\times13\times3\times12}{5}$*d*. $= \pounds34$. 6*s*. $4\frac{4}{5}$*d*.

(17) $\frac{47\times 864227}{9\times 99}d. = \frac{47\times 873}{9}d. = £18.\ 19s.\ 11d.$

(18) $\frac{1\times 101\times 179982}{90\times 999}d. = \frac{101\times 222}{10\times 111}d. = \frac{101}{5}d. = 1s.\ 8\frac{1}{5}d.$

(19) $500 \times (\frac{115}{30} - \frac{280}{84})\text{lb.} = 500 \times \frac{1}{2}\,\text{lb.} = 250\,\text{lb.}$

(20) 4 lb. 3 oz. 10 dwt. 20 gr. = 24740 gr.;
6 lb. 5 oz. 6 dwt. 6 gr. = 36110 gr.;

$\therefore$ fraction $= \frac{24740}{36110} = \frac{2\times 12370}{3\times 12370} = \frac{2}{3}$.

(21) Number of oz. $= \frac{113\cdot 6975}{3\cdot 89375} = 29\cdot 2 = 29\frac{1}{5}$.

(22) $(\cdot 375 \times 21)s. = 7\cdot 875s. = 7s.\ 10\frac{1}{2}d.$;
$\cdot\dot{5}\dot{4}$ of $99d. = \frac{54}{99} \times 99d. = 54d. = 4s.\ 6d.$;
$\cdot 0\dot{2}\dot{7}$ of $55s. = \frac{27}{990} \times 55s. = \frac{3}{2}s. = 1s.\ 6d.$;

$\therefore 7s.\ 10\frac{1}{2}d. + 4s.\ 6d. + 1s.\ 6d. = 13s.\ 10\frac{1}{2}d.$

23)
$$\left.\begin{array}{l} \frac{5}{18} \text{ of } 21s. = \frac{35}{6}s. = 5s.\ 10d.; \\ \frac{3}{32} \text{ of } 20s. = \frac{15}{8}s. = 1s.\ 10\frac{1}{2}d.; \\ \frac{7}{20} \text{ of } \ 5s. = \frac{7}{4}s. = 1s.\ \ 9d.; \\ \frac{5}{16} \text{ of } 12d. = \frac{15}{4}d. = 0s.\ \ 3\frac{3}{4}d. \end{array}\right\}\therefore \text{sum} = 9s.\ 9\frac{1}{4}d.$$

$\therefore$ decimal $= \frac{469}{960} = \frac{46\cdot 9}{96} = \frac{5\cdot 8625}{12} = \cdot 488541\dot{6}$.

(24)
$$\left.\begin{array}{l} \frac{5\times 1\times 77}{7\times 4}d. = \frac{55}{4}d. = 1s.\ 1\frac{3}{4}d. \\ \frac{1\times 2\times 30}{6\times 5}d. = 2d. \end{array}\right\}\therefore \text{sum} = 1s.\ 3\frac{3}{4}d.$$

$\therefore$ decimal $= \frac{63}{960} = \frac{6\cdot 3}{96} = \frac{\cdot 7875}{12} = \cdot 065625$.

(25) $\frac{3\times 375\times 10}{16\times 1000}s. = \frac{3\times 15}{16\times 4}s. = \frac{45}{64}s.$;

$\therefore (\frac{45}{64} + 2 - \frac{3}{4}) \times \frac{1}{20} = \frac{125}{64\times 20} = \frac{6\cdot 25}{64} = \cdot 09765625.$

(26) $\frac{4\times21}{9}s. = \frac{28}{3}s.$; $\frac{3\times1\times20}{8\times2}s. = \frac{15}{4}s.$;

$\frac{1\times3\times5}{12\times4}s. = \frac{5}{16}s.$; $\frac{1}{6}$ of $\frac{13}{18}$ of 1$s.$ = $\frac{13}{108}s.$;

$\therefore \left(\frac{28}{3} + \frac{15}{4} - \frac{5}{16} - \frac{13}{108}\right) \times \frac{1}{20} = \frac{5652-187}{16\times27\times20}$

$= \frac{5465}{16\times27\times20} = \frac{273\cdot25}{16\times27} = \frac{17\cdot078125}{27} = \cdot632523\dot{1}4\dot{8}.$

(27) $\left(\frac{11\times21}{14} - \frac{63}{3\times4}\right) \times \frac{1}{100\times20} = \frac{45}{4\times100\times20} = \frac{9}{1600}.$

(28) $\frac{2\times21}{9}s. = \frac{14}{3}s.$; $\frac{3\times20}{8}s. = \frac{15}{2}s.$;

$\therefore \left(\frac{14}{3} + \frac{15}{2} + \frac{5}{8} - \frac{47}{4}\right) \times \frac{1}{25} = \frac{307-282}{24} \times \frac{1}{25}$

$= \frac{25}{24\times25} = \frac{1}{24}.$

Ex. (xc), p. 154.

(1) £72. 6 f. = 72600 m. (2) £6. 4 f. 5 c. 6 m. = 6456 m.

(3) £45. 3 f. 2 c. 5 m. = 45325 m. (4) £7. 3 c. = 7030 m.

(5) £18. 4 m. = 18004 m. (6) £19. 3 c. 5 m. = 19035 m.

(7)
$$\begin{array}{r} \text{m.} \\ 64842 \\ 32032 \\ 14000 \\ 15200 \\ \hline 126074 \end{array} = £126.\ 0\ \text{f.}\ 7\ \text{c.}\ 4\ \text{m.}$$

(8)
$$\begin{array}{r} \text{m.} \\ 374350 \\ 432345 \\ 523 \\ 16004 \\ \hline 823222 \end{array} = £823.\ 2\ \text{f.}\ 2\ \text{c.}\ 2\ \text{m.}$$

(9)
$$\begin{array}{rcccc} £ & \text{f.} & \text{c.} & \text{m.} \\ 17 & \cdot\ 3 & \cdot\ 4 & \cdot\ 5 \\ 15 & \cdot\ 5 & \cdot\ 9 & \cdot\ 8 \\ \hline 1 & \cdot\ 7 & \cdot\ 4 & \cdot\ 7 \end{array}$$

(10)
$$\begin{array}{r} \text{m} \\ 15004 \\ 14999 \\ \hline 5 \end{array}$$

(11) $$\begin{array}{r} \text{m.} \\ 16738 \\ 43 \\ \hline 50214 \\ 66952 \\ \hline 719734 \end{array}$$ $= £719.\ 7$ f. 3 c. 4 m.

(12) $$\begin{array}{r} \text{m.} \\ 143034 \\ 73 \\ \hline 429102 \\ 1001238 \\ \hline 10441482 \end{array}$$ $= £10441.\ 4$ f. 8 c. 2 m.

(14) $$\begin{array}{r} 189\,)\,\overset{\text{m.}}{1674918}\,(\,\overset{\text{m.}}{8862} \\ 1512 \\ \hline 1629 \\ 1512 \\ \hline 1171 \\ 1134 \\ \hline 378 \\ 378 \\ \hline \end{array}$$ $= £8.\ 8$ f. 6 c. 2 m.

(13) $$\begin{array}{r|r} 5 & \overset{\text{m.}}{175425} \\ \hline 3 & 35085 \\ \hline & 11695 \end{array}$$ $= £11.\ 6$ f. 9 c. 5 m.

Ex. (xci), p. 156.

(1) 10*s.* = £·5 = 5 f. (2) 5*s.* = £·25 = 25 c.

(3) 2*s.* 6*d.* = £$\frac{1}{8}$ = £·125 = 125 m.

(4) 1*s.* = £$\frac{1}{20}$ = £·05 = 5 c.

(5) 6*d.* = £$\frac{1}{40}$ = £·025 = 25 m.

(6) 1*d.* = £$\frac{1}{240}$ = $\frac{1000}{240}$ m. = $4\frac{1}{6}$ m.

(7) 68*s.* = $\frac{68}{2}$ f. = 34 f. (8) 93*s.* = $\frac{93}{2}$ f. = 465 c.

(9)
$$\begin{array}{r|l} 20 & 14{\cdot}5 \\ \hline & \pounds\ 7{\cdot}725 \end{array}$$

(10)
$$\begin{array}{r|l} 12 & 3{\cdot}5 \\ \hline 20 & 15{\cdot}291\dot{6} \\ \hline & \pounds\ 13{\cdot}76458\dot{3} \end{array}$$

(11)
$$\begin{array}{r|l} 12 & 5{\cdot}0 \\ \hline 20 & {\cdot}41\dot{6} \\ \hline & \pounds\ 42{\cdot}0208\dot{3} \end{array}$$

(12)
$$\begin{array}{r|l} 12 & 1{\cdot}5 \\ \hline 20 & 3{\cdot}125 \\ \hline & \pounds\ 54{\cdot}15625 \end{array}$$

(13) 1 c. $= \frac{24}{10}d. = 2\frac{2}{5}d.$

(14) 1 m. $= \frac{24}{100}d. = \frac{24}{25}q.$

(15) £14·5 = £14. 10*s.*

(16) £3·45 = £3. 9*s.*

(17)
$$\begin{array}{r} \pounds 7{\cdot}864 \\ 20 \\ \hline s.\ 17{\cdot}280 \\ 12 \\ \hline d.\ 3{\cdot}360 \end{array}$$

(18)
$$\begin{array}{r} \pounds 423{\cdot}4 \\ 20 \\ \hline s.\ 8{\cdot}0 \end{array}$$

(19)
$$\begin{array}{r} \pounds 437{\cdot}25 \\ 20 \\ \hline s.\ 5{\cdot}00 \end{array}$$

(20)
$$\begin{array}{r} \pounds{\cdot}467325 \\ 20 \\ \hline s.\ 9{\cdot}346500 \\ 12 \\ \hline d.\ 4{\cdot}158000 \end{array}$$

(21)
$$\begin{array}{r} \pounds 5{\cdot}4325 \\ 20 \\ \hline s.\ 8{\cdot}6500 \\ 12 \\ \hline d.\ 7{\cdot}8000 \end{array}$$

(22)
$$\begin{array}{r} \pounds 7{\cdot}423425 \\ 20 \\ \hline s.\ 8{\cdot}468500 \\ 12 \\ \hline d.\ 5{\cdot}622000 \end{array}$$

Ex. (xcii), p. 159.

		s.	d.	
(1)	6*d.* is ½ of 1*s.*	6325	0	= cost at 1*s.* each.
	3*d.* is ½ of 6*d.*	3162	6	= .. .. .. 6*d.* .. ..
	¼*d.* is $\frac{1}{12}$ of 3*d.*	1581	3	= .. .. .. 3*d.* .. ..
		131	9¼	= .. .. .. ¼*d.* .. ..
	20	4875	6¼	= .. .. .. 9¾*d.* .. ..

£243. 15*s.* 6¼*d.*

		s.	d.	
(2)	6*d.* is ½ of 1*s.*	3254	0	= cost at 1*s.* each.
	4*d.* is ⅓ of 1*s.*	1627	0	= .. .. .. 6*d.* .. ..
	½*d.* is ⅛ of 4*d.*	1084	8	= .. .. .. 4*d.* .. ..
		135	7	= .. .. .. ½*d.* .. ..
	20	2847	3	= .. .. .. 10½*d.* .. ..

£142. 7*s.* 3*d.*

		s.	d.	
(3)	3*d.* is ¼ of 1*s.*	5271	0	= cost at 1*s.* each.
	½*d.* is ⅙ of 3*d.*	1317	9	= .. .. .. 3*d.* .. ..
		219	7½	= .. .. .. ½*d.* .. ..
	20	6808	4½	= .. .. .. 1*s.* 3½*d.* each.

£340. 8*s.* 4½*d.*

		s.	d.	
(4)	6*d.* is ½ of 1*s.*	1007	0	= cost at 1*s.* each.
	4*d.* is ⅓ of 1*s.*	503	6	= .. .. .. 6*d.* .. ..
	½*d.* is ⅛ of 4*d.*	335	8	= .. .. .. 4*d.* .. ..
	¼*d.* is ½ of ½*d.*	41	11½	= .. .. .. ½*d.* .. ..
		20	11¾	= .. .. .. ¼*d.* .. ..
	20	1909	1¼	= .. .. .. 1*s.* 10¼*d.* each.

£95. 9*s.* 1¼*d.*

		s.	d.	
(5)	6*d.* is $\frac{1}{2}$ of 1*s.*	7104 .	6	= cost at 1*s.* each.
	2*d.* is $\frac{1}{3}$ of 6*d.*	3552 .	3	= ...... 6*d.* ....
	$\frac{1}{2}$*d.* is $\frac{1}{4}$ of 2*d.*	1184 .	1	= ...... 2*d.* ....
		296 .	$0\frac{1}{4}$	= ...... $\frac{1}{2}$*d.* ....
	20	12136 .	$10\frac{1}{4}$	= ...... 1*s.* $8\frac{1}{2}$*d.* each.
		£606. 16*s.* $10\frac{1}{4}$*d.*		

		s.	d.	
(6)		4000 .	0	= cost at 1*s.* each.
			2	
	$\frac{1}{4}$*d.* = $\frac{1}{48}$ of 1*s.*	8000 .	0	= ...... 2*s.* ....
		83 .	4	= ...... $\frac{1}{4}$*d.* ....
	20	7916 .	8	= ...... 1*s.* $11\frac{3}{4}$*d.* each.
		£395. 16*s.* 8*d.*		

		s.	d.	
(7)		2510 .	0	= cost at 1*s.* each.
			7	
		17570 .	0	
			2	
	6*d.* is $\frac{1}{2}$ of 1*s.*	35140 .	0	= cost at 14*s.* each.
	1*d.* is $\frac{1}{6}$ of 6*d.*	1255 .	0	= ...... 6*d.* ....
	$\frac{1}{4}$*d.* is $\frac{1}{4}$ of 1*d.*	209 .	2	= ...... 1*d.* ....
		52 .	$3\frac{1}{2}$	= ...... $\frac{1}{4}$*d.* ....
	20	36656 .	$5\frac{1}{2}$	= ...... 14*s.* $7\frac{1}{4}$*d.* each.
		£1832. 16*s.* $5\frac{1}{2}$*d.*		

		s.	d.	
(8)		7251 .	0	= cost at 1*s.* each.
			2	
		14502 .	0	
			7	
	6*d.* is $\frac{1}{2}$ of 1*s.*	101514 .	0	= cost at 14*s.* each.
	2*d.* is $\frac{1}{3}$ of 6*d.*	3625 .	6	= ...... 6*d.* ....
	$\frac{1}{4}$*d.* is $\frac{1}{8}$ of 2*d.*	1208 .	6	= ...... 2*d.* ....
		151 .	$0\frac{3}{4}$	= ...... $\frac{1}{4}$*d.* ....
	20	106499 .	$0\frac{3}{4}$	= ...... 14*s.* $8\frac{1}{4}$*d.* each.
		£5324. 19*s.* $0\frac{3}{4}$*d.*		

(9)

	£	s.	d.	
	2154	5	0	= cost at £1 each.
			7	
1*s*. is $\frac{1}{20}$ of £1	15079	15	0	= ...... £7 ....
3*d*. is $\frac{1}{4}$ of 1*s*.	107	14	3	= ...... 1*s*. ....
	26	18	6¾	= ...... 3*d*. ....
	£15214	7	9¾	= cost at £7. 1*s*. 3*d*. each.

(10)

	£	s.	d.	
	3684	0	0	= cost at £1 each.
			2	
5*s*. is $\frac{1}{4}$ of £1	7368	0	0	= ...... £2 ....
1*s*. is $\frac{1}{5}$ of 5*s*.	921	0	0	= ...... 5*s*. ....
6*d*. is $\frac{1}{2}$ of 1*s*.	184	4	0	= ...... 1*s*. ....
3*d*. is $\frac{1}{2}$ of 6*d*.	92	2	0	= ...... 6*d*. ....
¼*d*. is $\frac{1}{12}$ of 3*d*.	46	1	0	= ...... 3*d*. ....
	3	16	9	= ...... ¼*d*. ....
	£8615	3	9	= cost at £2. 6*s*. 9¼*d*. each.

(11)

	£	s.	d.	
10*s*. is $\frac{1}{2}$ of £1	2017	15	0	= cost at £1 each.
2*s*. is $\frac{1}{5}$ of 10*s*.	1008	17	6	= ...... 10*s*. ....
1*s*. is $\frac{1}{2}$ of 2*s*.	201	15	6	= ...... 2*s*. ....
	100	17	9	= ...... 1*s*. ....
	£3329	5	9	= cost at £1. 13*s*. each.

(12)

	£	s.	d.	
5*s*. is $\frac{1}{4}$ of £1	3142	0	0	=cost at £1. each.
2*s*. 6*d*. is $\frac{1}{2}$ of 5*s*.	785	10	0	= ...... 5*s*. ....
3*d*. is $\frac{1}{10}$ of 2*s*. 6*d*.	392	15	0	= ...... 2*s*. 6*d*. ....
1*d*. is $\frac{1}{3}$ of 3*d*.	39	5	6	= ...... 3*d*. ....
¼*d*. is $\frac{1}{4}$ of 1*d*.	13	1	10	= ...... 1*d*. ....
	3	5	5½	= ...... ¼*d*. ....
	£4375	17	9½	=cost at £1. 7*s*. 10¼*d*. each.

(13)

	£	s.	d.	
10*s*. is ½ of £1	3210	0	0	=cost at £1 each.
5*s*. is ½ of 10*s*.	1605	0	0	= ...... 10*s*. ....
2*s*. 6*d*. is ½ of 5*s*.	802	10	0	= ...... 5*s*. ....
1*s*. is ⅕ of 5*s*.	401	5	0	= ...... 2*s*. 6*d*. ....
¾*d*. is $\frac{1}{16}$ of 1*s*.	160	10	0	= ...... 1*s*. ....
	10	0	7½	= ...... ¾*d*. ....
	£6189	5	7½	=cost at £1. 18*s*. 6¾*d*. each.

(14)

	£	s.	d.	
10*s*. is ½ of £1	4321	0	0	=cost at £1 each.
5*s*. is ½ of 10*s*.	2160	10	0	= ...... 10*s*. ....
2*s*. is ⅕ of 10*s*.	1080	5	0	= ...... 5*s*. ....
3*d*. is ⅛ of 2*s*.	432	2	0	= ...... 2*s*. ....
¾*d*. is ¼ of 3*d*.	54	0	3	= ...... 3*d*. ....
	13	10	0¾	= ...... ¾*d*. ....
	£8061	7	3¾	= ...... £1. 17*s*. 3¾*d*. each.

(15)

	£	s.	d.	
	2175	0	0	=cost at £1 each.
			2	
10*s*. is ½ of £1	4350	0	0	= ...... £2 ....
5*s*. is ½ of 10*s*.	1087	10	0	= ...... 10*s*. ....
3*d*. is $\frac{1}{20}$ of 5*s*.	543	15	0	= ...... 5*s*. ....
1½*d*. is ½ of 3*d*.	27	3	9	= ...... 3*d*. ....
	13	11	10½	= ...... ½*d*. ....
	£6022	0	7½	=cost at £2. 15*s*. 4½*d*. each.

(16)

	£	s.	d.	
5*s*. is ¼ of £1	3768	10	0	=cost at £1 each.
2*s*. is $\frac{1}{10}$ of £1	942	2	6	= ...... 5*s*. ....
4*d*. is ⅙ of 2*s*.	376	17	0	= ...... 2*s*. ....
½*d*. is ⅛ of 4*d*.	62	16	2	= ...... 4*d*. ....
	7	17	0¼	= ...... ½*d*. ....
	£5158	2	8¼	=cost at £1. 7*s*. 4½*d*. each.

(17)

	£	s.	d.	
	4276	0	0	= cost at £1 each.
			12	
10*s.* is $\frac{1}{2}$ of £1	51312	0	0	= ...... £12 ....
1*s.* is $\frac{1}{10}$ of 10*s.*	2138	0	0	= ...... 10*s.* ....
4*d.* is $\frac{1}{3}$ of 1*s.*	213	16	0	= ...... 1*s.* ....
1*d.* is $\frac{1}{4}$ of 4*d.*	71	5	4	= ...... 4*d.* ....
$\frac{1}{2}$*d.* is $\frac{1}{2}$ of 1*d.*	17	16	4	= ...... 1*d.* ....
	8	18	2	= ...... $\frac{1}{2}$*d.* ....
	£53761	15	10	= cost at £12.11*s.*5$\frac{1}{2}$*d.* each.

(18)

	£	s.	d.	
	5783	0	0	= cost at £1 each.
			2	
	11566	0	0	
			7	
5*s.* is $\frac{1}{4}$ of £1	80962	0	0	= cost at £14 each.
4*s.* is $\frac{1}{5}$ of £1	1445	15	0	= ...... 5*s.* ....
6*d.* is $\frac{1}{8}$ of 4*s.*	1156	12	0	= ...... 4*s.* ....
$\frac{1}{2}$*d.* is $\frac{1}{12}$ of 6*d.*	144	11	6	= ...... 6*d.* ....
	12	0	11$\frac{1}{2}$	= ...... $\frac{1}{2}$*d.* ....
	£83720	19	5$\frac{1}{2}$	= cost at £14. 9*s.* 6$\frac{1}{2}$*d.* each.

(19)

	£	s.	d.	
	3689	13	4	= cost at £1 each.
			2	
	7379	6	8	
			8	
10*s.* is $\frac{1}{2}$ of £1	59034	13	4	= cost at £16 each.
2*s.*6*d.* is $\frac{1}{4}$ of 10*s.*	1844	16	8	= ...... 10*s.* ....
3*d.* is $\frac{1}{10}$ of 2*s.*6*d.*	461	4	2	= ...... 2*s.* 6*d.* ..
	46	2	5	= ...... 3*d.* ....
	£61386	16	7	= cost at £16. 12*s.* 9*d.* each.

(20)

	£	*s.*	*d.*	
	7483	0	0	= cost at £1 each.
			2	
	14996	0	0	
			11	
10*s.* is $\frac{1}{2}$ of £1	164626	0	0	= cost at £22 each.
2*s.* is $\frac{1}{5}$ of 10*s.*	3741	10	0	= .. .. .. 10*s.* .. ..
1*s.* is $\frac{1}{2}$ of 2*s.*	748	6	0	= .. .. .. 2*s.* .. ..
2*d.* is $\frac{1}{6}$ of 1*s.*	374	3	0	= .. .. .. 1*s.* .. ..
$\frac{1}{2}$*d.* is $\frac{1}{4}$ of 2*d.*	62	7	2	= .. .. .. 2*d.* .. ..
	15	11	9$\frac{1}{2}$	= .. .. .. $\frac{1}{2}$*d.* .. ..
	£169567	17	11$\frac{1}{2}$	= cost at £22. 13*s.* 2$\frac{1}{2}$*d.* each.

(21)

	£	*s.*	*d.*	
5*s.* is $\frac{1}{4}$ of £1.	4234	10	0	= dividend at £1. in the £.
6*d.* is $\frac{1}{10}$ of 5*s.*	1058	12	6	= .. .. 5*s.* .. .. ..
	105	17	3	= .. .. 6*d.* .. .. ..
	£1164	9	9	= dividend at 5*s.* 6*d.* in the £.

(22)

	£	*s.*	*d.*	
2*s.* is $\frac{1}{10}$ of £1.	4975	0	0	= dividend at £1. in the £.
1*s.* is $\frac{1}{2}$ of 2*s.*	497	10	0	= .. .. 2*s.* .. .. ..
4*d.* is $\frac{1}{3}$ of 1*s.*	248	15	0	= .. .. 1*s.* .. .. ..
$\frac{1}{2}$*d.* is $\frac{1}{8}$ of 4*d.*	82	18	4	= .. .. 4*d.* .. .. ..
	10	7	3$\frac{1}{2}$	= .. .. $\frac{1}{2}$*d.* .. .. ..
	£839	10	7$\frac{1}{2}$	= dividend at 3*s.* 4$\frac{1}{2}$*d.* in the £.

(23)

	£	*s.*	*d.*	
5*s.* is $\frac{1}{4}$ of £1.	3729	18	6	= div. at £1. in the £.
2*s.* 6*d.* is $\frac{1}{2}$ of 5*s.*	932	9	7$\frac{1}{2}$	= .. .. .. 5*s.* .. ..
3*d.* is $\frac{1}{10}$ of 2*s.* 6*d.*	466	4	9$\frac{3}{4}$	= .. .. .. 2*s.* 6*d.* .. ..
$\frac{3}{4}$*d.* is $\frac{1}{4}$ of 3*d.*	46	12	5$\frac{31}{40}$	= .. .. .. 3*d.* .. ..
	11	13	1$\frac{71}{160}$	= .. .. .. $\frac{3}{4}$*d.* .. ..
	£1457	0	0$\frac{15}{32}$	= div. at 7*s.* 9$\frac{3}{4}$*d.* in £,

Ex. (xciii), p. 161.

	£	s.	d.	
(1)	3	17	6	= cost of 1 cwt.
			5	
	19	7	6	
			5	
2 qr. is $\frac{1}{2}$ of 1 cwt.	96	17	6	= cost of 25 cwt.
14 lb. is $\frac{1}{4}$ of 2 qr.	1	18	9	= .. .. .. 2 qr.
		9	$8\frac{1}{4}$	= .. .. .. 14 lb.
	£99	5	$11\frac{1}{4}$	= cost of 25 cwt. 2 qr. 14 lb.

	£	s.	d.	
(2)	4	5	8	= cost of 1 cwt.
			9	
	38	11	0	
			8	
1 qr. is $\frac{1}{4}$ of 1 cwt.	308	8	0	= cost of 72 cwt.
14 lb. is $\frac{1}{2}$ of 1 qr.	1	1	5	= .. .. .. 1 qr.
4 lb. is $\frac{1}{7}$ of 1 qr.		10	$8\frac{1}{2}$	= .. .. .. 14 lb.
		3	$0\frac{5}{7}$	= .. .. .. 4 lb.
	£310	3	$2\frac{3}{14}$	= cost of 72 cwt. 1 qr. 18 lb.

	£	s.	a.	
(3)	2	17	9	= cost of 1 cwt.
			12	
	34	13	0	
			6	
	207	18	0	= cost of 72 cwt.
2 qr. is $\frac{1}{2}$ of 1 cwt.	17	6	6	= .. .. .. 6 cwt.
1 qr. is $\frac{1}{2}$ of 2 qr.	1	8	$10\frac{1}{2}$	= .. .. .. 2 qr.
7 lb. is $\frac{1}{4}$ of 1 qr.		14	$5\frac{1}{4}$	= .. .. .. 1 qr.
4 lb. is $\frac{1}{7}$ of 1 qr.		3	$7\frac{5}{16}$	= .. .. .. 7 lb.
1 lb. is $\frac{1}{4}$ of 4 lb.		2	$0\frac{3}{4}$	= .. .. .. 4 lb.
			$6\frac{3}{16}$	= .. .. .. 1 lb.
	£227	14	0	= cost of 78 cwt. 3 qr. 12 lb.

(4)

	£	s.	d.	
	3	17	10	= cost of 1 cwt.
			4	
	15	11	4	
			9	
	140	2	0	= cost of 36 cwt.
2 qr. is $\frac{1}{2}$ of 1 cwt.	3	17	10	= ...... 1 cwt.
7 lb. is $\frac{1}{8}$ of 2 qr.	1	18	11	= ...... 2 qr.
4 lb. is $\frac{1}{14}$ of 2 qr.		4	$10\frac{3}{8}$	= ...... 7 lb.
2 lb. is $\frac{1}{2}$ of 4 lb.		2	$9\frac{5}{14}$	= ...... 4 lb.
		1	$4\frac{19}{28}$	= ...... 2 lb.
	£146	7	$9\frac{23}{56}$	= cost of 37 cwt. 2 qr 13 lb.

(5)

	£	s.	d.	
	3	11	6	= cost of 1 cwt.
			10	
	35	15	0	
			5	
	178	15	0	= cost of 50 cwt.
14 lb. is $\frac{1}{8}$ of 1 cwt.	10	14	6	= ...... 3 cwt.
2 lb. is $\frac{1}{7}$ of 14 lb.		8	$11\frac{1}{4}$	= ...... 14 lb.
1 lb. is $\frac{1}{2}$ of 2 lb.		1	$3\frac{9}{28}$	= ...... 2 lb.
			$7\frac{37}{56}$	= ...... 1 lb.
	£190	0	$4\frac{13}{56}$	= cost of 53 cwt. 0 qr 17 lb.

(6)

	£	s.	d.	
	32	0	0	= cost of 1 ton.
			2	
5 cwt. is $\frac{1}{4}$ of 1 ton.	64	0	0	= cost of 2 tons.
2 cwt. is $\frac{1}{10}$ of 1 ton.	8	0	0	= ...... 5 cwt.
2 qr. is $\frac{1}{4}$ of 2 cwt.	3	4	0	= ...... 2 cwt.
4 lb. is $\frac{1}{14}$ of 2 qr.		16	0	= ...... 2 qr.
1 lb. is $\frac{1}{4}$ of 4 lb.		1	$1\frac{5}{7}$	= ...... 4 lb.
			$3\frac{3}{7}$	= ...... 1 lb.
	£76	1	$5\frac{1}{7}$	= cost of 2 tons 7 cwt. 2 qr. 5 lb.

(7)

	£	s.	d.	
	25	7	4	= cost of 1 cwt.
			8	
	202	18	8	
			2	
	405	17	4	= cost of 16 cwt.
1 qr. is $\frac{1}{4}$ of 1 cwt.	25	7	4	= .. .. .. 1 cwt.
7 lb. is $\frac{1}{4}$ of 1 qr.	6	6	10	= .. .. .. 1 qr.
4 lb. is $\frac{1}{7}$ of 1 qr.	1	11	$8\frac{1}{2}$	= .. .. .. 7 lb.
		18	$1\frac{3}{7}$	= .. .. .. 4 lb.
	£440	1	$3\frac{13}{14}$	= cost of 17 cwt. 1 qr. 11 lb.

(8)

	£	s.	d.	
	7	3	4	= cost of 1 ton.
			5	
2 qr. is $\frac{1}{40}$ of 1 ton.	35	16	8	= cost of 5 tons.
1 qr. is $\frac{1}{2}$ of 2 qr.		3	7	= .. .. .. 2 qr.
14 lb. is $\frac{1}{2}$ of 1 qr.		1	$9\frac{1}{2}$	= .. .. .. 1 qr.
2 lb. is $\frac{1}{7}$ of 14 lb.			$10\frac{3}{4}$	= .. .. .. 14 lb.
1 lb. is $\frac{1}{2}$ of 2 lb.			$1\frac{15}{28}$	= .. .. .. 2 lb.
			$\frac{43}{56}$	= .. .. .. 1 lb.
	£ 36	3	$1\frac{31}{56}$	= cost of 5 tons 3 qr. 17 lb.

(9)

	£	s.	d.	
	5	6	8	= cost of 1 ton.
			8	
2 cwt. is $\frac{1}{10}$ of 1 ton.	42	13	4	= cost of 8 tons.
1 cwt. is $\frac{1}{2}$ of 2 cwt.		10	8	= .. .. .. 2 cwt.
14 lb. is $\frac{1}{8}$ of 1 cwt.		5	4	= .. .. .. 1 cwt.
7 lb. is $\frac{1}{2}$ of 14 lb.			8	= .. .. .. 14 lb.
2 lb. is $\frac{1}{7}$ of 14 lb.			4	= .. .. .. 7 lb.
2 lb. is $\frac{1}{7}$ of 14 lb.			$1\frac{1}{7}$	= .. .. .. 2 lb.
2 lb. is $\frac{1}{7}$ of 14 lb.			$1\frac{1}{7}$	= .. .. .. 2 lb.
			$1\frac{1}{7}$	= .. .. .. 2 lb.
	£43	10	$7\frac{1}{7}$	= cost of 8 tons 3 cwt. 27 lb.

	£	s.	d.	
(10)	4	2	6	= cost of 1 lb.
			3	
4 oz. is $\frac{1}{3}$ of 1 lb.	12	7	6	= cost of 3 lb.
5 dwt. is $\frac{1}{16}$ of 4 oz.	1	7	6	= .. .. .. 4 oz.
1 dwt. is $\frac{1}{5}$ of 5 dwt.		1	$8\frac{5}{8}$	= .. .. .. 5 dwt.
1 dwt. is $\frac{1}{5}$ of 5 dwt.			$4\frac{1}{8}$	= .. .. .. 1 dwt.
			$4\frac{1}{8}$	= .. .. .. 1 dwt.
	£13	17	$4\frac{7}{8}$	= cost of 3 lb. 4 oz. 7 dwt.

	£	s.	d.	
(11)	10	0	0	= cost of 1 rood.
			23	
4 po. is $\frac{1}{10}$ of 1 ro.	230	0	0	= cost of 5 ac. 3 ro.
$4\frac{1}{2}$ yd. is $\frac{9}{242}$ of 4 po.	1	0	0	= .. .. .. 4 po.
			$8\frac{112}{121}$	= .. .. .. $4\frac{1}{2}$ yd.
	£231	0	$8\frac{112}{121}$	= cost of 5 ac. 3 ro. 4 po. $4\frac{1}{2}$ yd.

	£	s.	d.	
(12)	3	18	2	= cost of 1 cwt.
			12	
2 qr. is $\frac{1}{2}$ of 1 cwt.	46	18	0	= cost of 12 cwt.
1 qr. is $\frac{1}{2}$ of 2 qr.	1	19	1	= .. .. .. 2 qr.
14 lb. is $\frac{1}{2}$ of 1 qr.		19	$6\frac{1}{2}$	= .. .. .. 1 qr.
7 lb. is $\frac{1}{2}$ of 14 lb.		9	$9\frac{1}{4}$	= .. .. .. 14 lb.
1 lb. is $\frac{1}{7}$ of 7 lb.		4	$10\frac{5}{8}$	= .. .. .. 7 lb.
8 oz. is $\frac{1}{2}$ of 1 lb.			$8\frac{3}{8}$	= .. .. .. 1 lb.
4 oz. is $\frac{1}{2}$ of 8 oz.			$4\frac{3}{16}$	= .. .. .. 8 oz.
			$2\frac{3}{32}$	= .. .. .. 4 oz.
	£50	12	$6\frac{1}{32}$	= cost of 12 cwt. 3 qr. 22 lb. 12 oz.

(13)

	£	s.	d.	
	2	18	$10\frac{2}{3}$	= cost of 1 acre.
			10	
2 ro. is $\frac{1}{2}$ of 1 ac.	29	8	$10\frac{2}{3}$	= cost of 10 acres.
1 ro. is $\frac{1}{2}$ of 2 ro.	1	9	$5\frac{1}{3}$	= .. .. .. 2 ro.
20 po. is $\frac{1}{2}$ of 1 ro.		14	$8\frac{2}{3}$	= .. .. .. 1 ro.
5 po. is $\frac{1}{4}$ of 20 po.		7	$4\frac{1}{3}$	= .. .. .. 20 po.
1 po. is $\frac{1}{5}$ of 5 po.		1	$10\frac{1}{12}$	= .. .. .. 5 po.
			$4\frac{5}{12}$	= .. .. .. 1 po.
	£32	2	$7\frac{1}{2}$	= cost of 10 ac. 3 ro. 26 po.

(14)

	£	s.	d.	
	3	14	$8\frac{1}{4}$	= cost of 1 cwt.
			12	
	44	16	3	
			11	
2 qr. is $\frac{1}{2}$ of 1 cwt.	492	18	9	= cost of 6 tons 12 cwt.
1 qr. is $\frac{1}{2}$ of 2 qr.	1	17	$4\frac{1}{8}$	= .. .. .. 2 qr.
7 lb. is $\frac{1}{4}$ of 1 qr.		18	$8\frac{1}{16}$	= .. .. .. 1 qr.
$3\frac{1}{2}$ lb. is $\frac{1}{2}$ of 7 lb.		4	$8\frac{1}{64}$	= .. .. .. 7 lb.
		2	$4\frac{1}{128}$	= .. .. .. $3\frac{1}{2}$ lb.
	£496	1	$9\frac{27}{128}$	= cost of 6 tons 12 cwt. 3 qr. $10\frac{1}{2}$ lb.

(15)

	£	s.	d.	
	12	12	0	= cost of 1 cwt.
			9	
	113	8	0	
			7	
2 qr. is $\frac{1}{2}$ of 1 cwt.	793	16	0	= cost of 63 cwt.
1 qr. is $\frac{1}{2}$ of 2 qr.	6	6	0	= .. .. .. 2 qr.
14 lb. is $\frac{1}{2}$ of 1 qr.	3	3	0	= .. .. .. 1 qr.
$3\frac{1}{2}$ lb. is $\frac{1}{4}$ of 14 lb.	1	11	6	= .. .. .. 14 lb.
		7	$10\frac{1}{2}$	= .. .. .. $3\frac{1}{2}$ lb.
	£805	4	$4\frac{1}{2}$	= cost of 63 cwt. 3 qr. $17\frac{1}{2}$ lb.

	£	s.	d.	
(16)	105	0	0	= cost of 1 acre.
			7	
	735	0	0	
			4	
	2940	0	0	= cost of 28 acres.
2 ro. is $\frac{1}{2}$ of 1 ac.	105	0	0	= .. .. .. 1 acre.
1 ro. is $\frac{1}{2}$ of 2 ro.	52	10	0	= .. .. .. 2 ro.
5 po. is $\frac{1}{8}$ of 1 ro.	26	5	0	= .. .. .. 1 ro.
	3	5	$7\frac{1}{2}$	= .. .. .. 5 po.
	£3127	0	$7\frac{1}{2}$	= cost of 29 acres 3 ro. 5 po.

	£	s.	d.	
(17)	3	17	6	= cost of 1 oz.
			4	
	15	10	0	
			4	
5 dwt. is $\frac{1}{4}$ of 1 oz.	62	0	0	= cost of 16 oz.
1 dwt. is $\frac{1}{5}$ of 5 dwt.		19	$4\frac{1}{2}$	= .. .. .. 5 dwt.
20 gr. is $\frac{1}{6}$ of 5 dwt.		3	$10\frac{1}{2}$	= .. .. .. 1 dwt.
		3	$2\frac{3}{4}$	= .. .. .. 20 gr.
	£63	6	$5\frac{3}{4}$	= cost of 16 oz. 6 dwt. 20 gr.

	£	s.	d.	
(18)	42	2	4	= cost of 1 acre.
			5	
	210	11	8	
			5	
1 ro. is $\frac{1}{4}$ of 1 ac.	1052	18	4	= cost of 25 acres.
10 po. is $\frac{1}{4}$ of 1 ro.	10	10	7	= .. .. .. 1 ro.
	2	12	$7\frac{3}{4}$	= .. .. .. 10 po.
	£1066	1	$6\frac{3}{4}$	= cost of 25 ac. 1 ro. 10 po.

	£	s.	d.	
(19)	22	8	0	= cost of 1 cwt.
			13	
2 qr. is ½ of 1 cwt.	291	4	0	= cost of 13 cwt.
1 qr. is ½ of 2 qr.	11	4	0	= ...... 2 qr.
14 lb. is ½ of 1 qr.	5	12	0	= ...... 1 qr.
2 lb. is ⅐ of 14 lb.	2	16	0	= ...... 14 lb.
1 lb. is ½ of 2 lb.		8	0	= ...... 2 lb.
		4	0	= ...... 1 lb.
	£311	8	0	= cost of 13 cwt. 3 qr. 17 lb.

	£	s.	d.	
(20)	2	12	6	= cost of 1 cwt.
			10	
	26	5	0	
			30	
	787	10	0	= cost of 300 cwt.
	26	5	0	= ...... 10 cwt.
2 qr. is ½ of 1 cwt.	23	12	6	= ...... 9 cwt.
1 qr. is ½ of 2 qr.	1	6	3	= ...... 2 qr.
14 lb. is ½ of 1 qr.		13	1½	= ...... 1 qr.
2 lb. is ⅐ of 14 lb.		6	6¾	= ...... 14 lb.
			11¼	= ...... 2 lb.
	£839	14	4½	= cost of 319 cwt. 3 qr 16 lb.

Ex. (xciv), p. 163.

(1)	£	s.	d.
10¼ × 11*d.* =	0	9	4¾
7¾ × 8*d.* =	0	5	2
2½ × 1*s.* =	0	2	6
5¾ × 9*d.* =	0	4	3¾
1½ × 11*d.* =	0	1	4½
3¼ × 1*s.* =	0	3	3
	£1	6	0

(2)	£	s.	d.
5 × 2*s.* 8*d.* =	0	13	4
2¼ × 4*s.* 6*d.* =	0	10	1½
15½ × 5½*d.* =	0	7	1¼
17 × 4*d.* =	0	5	8
7½ × 11*d.* =	0	6	10½
4 × 6½*d.* =	0	2	2
	£2	5	3¼

		£	s.	d.
(3)	15½ × 2s. 3d. =	1	14	10½
	29 × 8½d. =	1	0	6½
	25 × 2s. 4d. =	2	18	4
	17 × 1s. 2d. =	0	19	10
	12½ × 11½d. =	0	11	11¾
	3½ × 9s. 10d. =	1	14	5
		£8	19	11¾

		£	s.	d.
(4)	23 × 7s. 8d. =	8	16	4
	17 × 10½d. =	0	14	10½
	13½ × 9½d. =	0	10	8¼
	18 × 2s. 9d. =	2	9	6
	5 × 3s. 3d. =	0	16	3
	18 × 6½d. =	0	9	9
		£13	17	4¾

		£	s.	d.
(5)	5 × £1. 4s. =	6	0	0
	12½ × 2s. 11d. =	1	16	5½
	15¾ × 9s. 6d. =	7	9	7½
	5½ × 1s. 9d. =	0	9	7½
	2 × £1. 3s. 9d. =	2	7	6
	25¼ × 9d. =	0	18	11¼
		£19	2	1¾

		£	s.	d.
(6)	39½ × 5s. 4d. =	10	10	8
	62¾ × 3s. 6d. =	10	19	7½
	27 × 1s. 2d. =	1	11	6
	34½ × 2s. 3d. =	3	17	7½
	43½ × 1s. 1d. =	2	7	1½
		£29	6	6½

Ex. (xxv), p. 164.

(1) Cost of 1 lb. = $\frac{8s.\ 6d.}{17}$ = 6d.

(2) Daily walk = $\frac{62}{4}$ miles = 15½ miles.

(3) 1 man will take 4 × 6 days, or, 24 days.

(4) 1 egg will cost $\frac{15}{10}d.$, or, $1\frac{1}{2}d.$

(5) 1 person will eat it in 9 × 34 days, or, 306 days.

(6) Tax on £1 is $\frac{\pounds 6\ 12s.\ 6d.}{265}$, or, $\frac{1590d.}{265}$, or, 6*d.*

Ex. (xcvi), p. 167.

(1) He walks 1 mile in $\frac{4}{62}$ day ;
∴ he walks 93 miles in $\frac{4 \times 93}{62}$, or, 6 days.

(2) 1 man can reap the field in (12 × 4) days ;
∴ 32 men can reap the field in $\frac{12 \times 4}{32}$ days, or, $1\frac{1}{2}$ days.

(3) 1 lb. of coffee will cost $\frac{182}{14}d.$;
∴ 129 lb. of coffee will cost $\frac{182 \times 129}{14}d.$, or, £6. 19*s.* 9*d.*

(4) 1 acre will cost £$\frac{12250}{350}$;
∴ 273 acres will cost £$\frac{12250 \times 273}{350}$, or, £9555.

(5) 1 lb. will cost $\frac{30}{3}d.$, or, 10*d.* ;
∴ 14 lb. will cost 14 × 10*d.*, or 11*s.* 8*d.*

(6) 1 egg can be bought for $\frac{12}{8}d.$, or $1\frac{1}{2}d.$;
∴ 60 eggs can be bought for 60 × $1\frac{1}{2}d.$, or, 7*s.* 6*d.*

(7) 1 lb. will cost $\frac{270}{15}q.$;
∴ 1 cwt. will cost $\frac{112 \times 270}{15}q.$, or, 2016*q.*, or, £2. 2*s.*

(8) In 1 day the work is done by (15 × 20) men ;
∴ in 12 days the work is done by $\frac{15 \times 20}{12}$ men, or, 25 men.

(9) The rent of 1 acre is $\frac{1190}{17}s.$, or, 70*s.* ;
∴ the rent of 86 acres is 86 × 70*s.*, or, £301.

(10) In 1 day he walks $\frac{116}{8}$ miles ;
∴ in 14 days he walks $\frac{116 \times 14}{8}$ miles, or, 203 miles.

(11) 1 farthing's worth will weigh $\frac{6}{5}$ gr. ;
∴ 1 crown's worth will weigh $\frac{6 \times 240}{5}$ gr., or, 288 gr.

(12) 1 lamb sells for £$\frac{176}{80}$, or, £$\frac{11}{5}$;
∴ 25 lambs sell for £$\frac{25 \times 11}{5}$, or, £55.

(13) 1 sheep sells for £$\frac{48}{20}$, or, £$\frac{12}{5}$;
∴ 270 sheep sell for £$\frac{270 \times 12}{5}$, or, £648.

(14) 1 week's wages will be $\frac{208}{52}$*s.*, or, 4*s.*;
∴ 7 weeks' wages will be 7 × 4*s.*, or, £1. 8*s.*

(15) 1 cwt. will cost $\frac{1359}{3}$*d.*, or, 453*d.*
∴ 147 cwt. will cost 147 × 453*d.*, or, 66591*d.*, or, £277. 9*s.* 3*d.*

(16) 1 yard is worth $\frac{92}{4}$*d.*, or, 23*d.*;
∴ 57 yards are worth 57 × 23*d.*, or, 1311*d.*, or, £5. 9*s.* 3*d.*

(17) 1 day's salary is $\frac{£191.\ 12s.\ 6d.}{365}$, or, $\frac{45990}{365}$*d.*
∴ 60 days' salary is $\frac{60 \times 45990}{365}$*d.*, or, (12 × 630)*d.*, or, £31. 10*s.*

(18) At the rate of 1 knot an hour she would take (63 × 6) days;
∴ at the rate of 7 knots an hour she would take $\frac{63 \times 6}{7}$ days, or, 54 days.

(19) For 1 day he receives $\frac{8176}{365}$*s.*;
∴ for 15 days he receives $\frac{8176 \times 15}{365}$*s.*, or, £16. 16*s.*

(20) For £1075 he can only pay £215;
∴ for £1 he can only pay £$\frac{215}{1075}$, or, £$\frac{1}{5}$, or, 4*s.*

(21) 1 bushel is worth $\frac{17s.\ 6d.}{3}$, or, 5*s.* 10*d.*;
∴ 350 bushels are worth 350 × (5*s.* 10*d.*), or, £102. 1*s.* 8*d.*

(22) 1 foot will cost $\frac{405}{45}$*d.*, or, 9*d.*;
∴ 61 feet will cost 61 × 9*d.*, or £2. 5*s.* 9*d.*

(23) 1 lb. can be bought for $\frac{119}{14}$*d.*, or, $\frac{17}{2}$*d.*;
∴ 480 lb. can be bought for $\frac{480 \times 17}{2}$*d.*, or, £17.

(24) 1 qr. can be bought for $\frac{135}{15}$*s.*, or, 9*s.*;
∴ 8 qr. can be bought for 8 × 9*s.*, or, £3. 12*s.*

(25) 1 lb. will cost $\frac{5650}{315}$*q.*;
∴ 9 cwt. will cost $\frac{9\times112\times5650}{315}$*q.*, or, 18080*q.*, or, £18. 16*s.* 8*d.*

(26) 1 lb. will cost $\frac{1050}{3\times112}$*d.*, or, $\frac{150}{3\times16}$*d.*, or, $\frac{25}{8}$*d.*;
∴ 7 cwt. 2 qr. 14 lb. will cost $\frac{854\times25}{8}$*d.*, or, £11. 2*s.* $4\frac{3}{4}$*d.*

(27) 1 half-peck will cost $\frac{9945}{221}$*q.*, or, 45*q.*;
∴ 12 half-pecks will cost 12 × 45*q.*, or, 11*s.* 3*d.*

(28) For 1 sixpence I can buy $\frac{405}{567}$ lb., or, $\frac{5}{7}$ lb.;
∴ for 945 sixpences I can buy $\frac{945\times5}{7}$ lb., or, 6 cwt. 3 lb.

(29) 1 peck will cost $\frac{785}{30}$*d.*, or, $\frac{157}{6}$*d.*;
∴ 18 pecks will cost $\frac{18\times157}{6}$*d.*, or, £1. 19*s.* 3*d.*

Ex. (xcvii), p. 169.

(1) $\frac{1}{5}$ of the estate is worth £$\frac{7520}{3}$;
∴ the estate is worth £$\frac{7520\times5}{3}$;
∴ $\frac{5}{8}$ of the estate is worth £$\frac{5\times7520\times5}{8\times3}$, or, £7833. 6*s.* 8*d.*

(2) $\frac{2}{3}$ of $\frac{3}{8}$, that is $\frac{1}{4}$, of the ship is worth £1260;
∴ the ship is worth 4 × £1260, or, £5040.

(3) For 1 halfpenny I can buy $\frac{3\frac{2}{5}}{183\times2}$ lb., or, $\frac{17}{5\times183\times2}$ lb.;
∴ for 2013 halfpence I can buy $\frac{2013\times17}{5\times183\times2}$, or, $18\frac{7}{10}$ lb.

(4) 1 cwt. of coal will cost $\frac{54\times14}{3\times20}$*d.*;
∴ $5\frac{1}{2}$ cwt. of coal will cost $\frac{11\times54\times14}{2\times3\times20}$*d.*, or, 5*s.* $9\frac{3}{10}$*d.*

(5) In 1 day the part done is $\frac{\frac{2}{11}}{25}$, or, $\frac{2}{11\times25}$;
∴ in $11\frac{2}{3}$ days the part done is $\frac{35\times2}{3\times11\times25}$, or, $\frac{14}{165}$.

(6) He walks 1 foot in $\frac{330}{113300}$ min.;
∴ he walks 7920 feet in $\frac{7920\times330}{96800}$ min., or, 27 min.

(7) $\frac{2}{7}$ of $\frac{5}{16}$ of $\frac{3}{14}$ of the estate sold for £$\frac{965}{8}$;
∴ the estate was worth £$\frac{7 \times 16 \times 14 \times 965}{2 \times 5 \times 3 \times 8}$;
∴ $\frac{1}{5}$ of $\frac{3}{16}$ of the estate was worth £$\frac{3 \times 7 \times 16 \times 14 \times 965}{5 \times 16 \times 2 \times 5 \times 3 \times 8}$, or,
£236. 8*s*. 6*d*.

(8) 1 cwt. of goods for 7*s*. 9*d*. can be carried $15 \cdot 5 \times 60$ miles;
∴ 3·25 cwt. of goods for 7*s*. 9*d*. can be carried $\frac{60 \times 15 \cdot 5}{3 \cdot 25}$ miles, or, $286\frac{2}{13}$ miles.

(9) $\frac{1}{9}$ of $\frac{7}{8}$ of $\frac{3}{11}$ of the vessel is worth £350;
∴ the vessel is worth £$\frac{9 \times 8 \times 11 \times 350}{7 \times 3}$, or, £$(3 \times 8 \times 11 \times 50)$;
∴ $\frac{1}{11}$ of $\frac{1}{12}$ of the vessel is worth £$\frac{3 \times 8 \times 11 \times 50}{11 \times 12}$, or, £100.

(10) 1 lb. of gold is worth £$(12 \times 3 \cdot 89)$;
·04 lb. of gold is worth £$(\cdot 04 \times 12 \times 3 \cdot 89)$, or,
£1. 17*s*. 4·128*d*.

(11) 6 inches of the first kind cost $\frac{9}{8\frac{1}{2}}$*d*., or, $\frac{18}{17}$*d*.;

6 inches of the second kind cost $\frac{11}{10\frac{1}{4}}$*d*., or, $\frac{44}{41}$*d*.;

Now $\frac{18}{17} = \frac{738}{17 \times 41}$, and $\frac{44}{41} = \frac{748}{17 \times 41}$;
∴ the first is the cheaper kind.

(12) For £1 we can carry for 20 miles $\frac{60}{14\frac{1}{2}}$ cwt., or, $\frac{120}{29}$ cwt.;
∴ for £$5\frac{7}{16}$ we can carry for 20 miles $\frac{87 \times 120}{16 \times 29}$ cwt., or,
$22\frac{1}{2}$ cwt.

[Ex. (xcviii), p. 172.

(1) *A* can do $\frac{1}{6}$ of the work in an hour;
B can do $\frac{1}{9}$ of the work in an hour;
∴ *A* and *B* do $\frac{1}{6} + \frac{1}{9}$, or, $\frac{5}{18}$ in an hour;
∴ they do the work in $\frac{18}{5}$ hours, or, $3\frac{3}{5}$ hours.

(2) A, B, and C do $\frac{1}{35} + \frac{1}{40} + \frac{1}{45}$, or, $\frac{191}{2520}$ in a day;
$\therefore$ they do the work in $\frac{2520}{191}$ days, or, $13\frac{37}{191}$ days.

(3) Twice (A's work + B's work + C's work) daily
$= \frac{1}{3} + \frac{1}{3\frac{1}{2}} + \frac{1}{4} = \frac{73}{84}$;
$\therefore$ A, B, and C do $\frac{73}{168}$ of the work daily;
$\therefore$ they do the work in $\frac{168}{73}$ days, or, $2\frac{22}{73}$ days.

(4) Together they fill $\frac{1}{6} + \frac{1}{8} + \frac{1}{12}$, or, $\frac{3}{8}$ in a minute;
$\therefore$ they fill the vessel in $\frac{8}{3}$ minutes, or, $2\frac{2}{3}$ minutes.

(5) In one day A can do $\frac{1}{14}$ of $\frac{7}{10}$, or, $\frac{1}{20}$ of the work;
$\therefore$ in two days A can do $\frac{1}{10}$ of the work;
Now $\frac{3}{10}$ remained for A and B to do;
$\therefore$ B does $\frac{2}{10}$ in 2 days;
$\therefore$ B can do the work in 10 days.

(6) A and C do $\frac{3}{4}$ in an hour;
A does $\frac{1}{3}$ in an hour;
$\therefore$ C does $\frac{3}{4} - \frac{1}{3}$, or, $\frac{5}{12}$ in an hour;
B and C do $\frac{2}{3}$ in an hour;
$\therefore$ B does $\frac{2}{3} - \frac{5}{12}$, or, $\frac{3}{12}$, or, $\frac{1}{4}$ in an hour;
$\therefore$ B can do the work in 4 hours.

(7) A does $\frac{12}{27}$, or, $\frac{4}{9}$ in 12 days;
B does $\frac{5}{15}$, or, $\frac{1}{3}$ in 5 days;
$\therefore$ A and B do $\frac{4}{9} + \frac{1}{3}$, or, $\frac{7}{9}$ of the work;
C does $\frac{2}{9}$ in 4 days, or, $\frac{1}{18}$ in 1 day;
$\therefore$ C could have done the whole in 18 days.

(8) Part filled in 10 minutes $= \frac{10}{18} + \frac{10}{20} - \frac{10}{40}$, or, $\frac{29}{36}$.

Ex. (xcix), p. 174.

(1) The minute-hand gains 11 minute-divisions in 12 minutes,
1 minute-division in $\frac{12}{11}$ minute,
20 minute-divisions in $\frac{240}{11}$ minutes;
∴ time will be $\frac{240}{11}$ min., or, $21\frac{9}{11}$ min. past 4.

(2) The minute-hand gains 30 min.-div. in $\frac{12\times30}{11}$ minutes;
∴ time will be $\frac{360}{11}$ min., or, $32\frac{8}{11}$ min. past 6.

(3) The minute-hand gains 45 min.-div. in $\frac{45\times12}{11}$ minutes;
∴ time will be $\frac{540}{11}$ min., or, $49\frac{1}{11}$ min. past 9.

(4) The minute-hand has to gain 20 − 15, or, 5 min.-div.;
∴ time will be $\frac{5\times12}{11}$ min., or, $5\frac{5}{11}$ min. past 4.
The minute-hand has to gain 20 + 15, or, 35 min.-div.;
∴ time will be $\frac{35\times12}{11}$ min., or, $38\frac{2}{11}$ min. past 4.

(5) The minute-hand has to gain 35 − 15, or, 20 min.-div.;
∴ time will be $\frac{20\times12}{11}$ min., or, $21\frac{9}{11}$ min. past 7.
The minute-hand has to gain 35 + 15, or, 50 min.-div.;
∴ time will be $\frac{50\times12}{11}$ min., or, $54\frac{6}{11}$ min. past 7.

(6) The minute-hand has to gain 15 − 5, or, 10 min.-div.;
∴ time will be $\frac{10\times12}{11}$ min., or, $10\frac{10}{11}$ min. past 11.
The minute-hand has to gain 55 − 15, or, 40 min. div.;
∴ time will be $\frac{40\times12}{11}$ min., or, $43\frac{7}{11}$ min. past 11.

(7) The minute-hand has to gain 5 + 30, or, 35 min.-div.;
∴ time will be $\frac{35\times12}{11}$ min., or, $38\frac{2}{11}$ min. past 1.

(8) The minute-hand has to gain 20 + 30, or, 50 min.-div.;
∴ time will be $\frac{50\times12}{11}$ min., or, $54\frac{6}{11}$ min. past 4.

(9) The minute-hand has to gain 40 − 30, or, 10 min.-div.;
∴ time will be $\frac{10\times12}{11}$ min., or, $10\frac{10}{11}$ min. past 8.

Ex. (o), p. 175.

(1) For 1 mile I can carry 36 × 1200 lb.;
∴ for 24 miles I can carry $\frac{36 \times 1200}{24}$ lb., or, 1800 lb

(2) The cost of one-eleventh of a grain is $\frac{1383}{110640}$*d.*;
∴ cost of 1 oz. is $\frac{1383 \times 20 \times 24 \times 11}{110640}$*d.*, or, 5*s.* 6*d.*

(3) The cost of one-ninth of an oz. is $\frac{1065}{63616}$*d.*;
∴ cost of 1 cwt. is $\frac{1065 \times 4 \times 28 \times 16 \times 9}{63616}$*d.*, or, £1. 2*s.* 6*d.*

(4) The whole ship is worth £$\frac{9 \times 3264}{4}$;
∴ $\frac{5}{8}$ of the ship is worth £$\frac{5 \times 9 \times 3264}{8 \times 4}$, or, £4590.

(5) 1 oz. of each of the 12 spoons is worth $\frac{270}{45}$*s.*, or, 6*s.*;
∴ 22 oz. of silver in tankard are worth (22 × 6)*s.*, or, £6. 12*s.*

(6) In 1 day he spends $\frac{308}{35}$*s.*, or, $\frac{44}{5}$*s.*;
∴ in 365 days he spends $\frac{365 \times 44}{5}$*s.*, or, £160. 12*s.*;
∴ his annual income is £100 + £160. 12*s.*, or, £260. 12*s.*

(7) On £1 the income-tax is 5*d.*;
∴ on £675 the income-tax is (675 × 5)*d.*, or, £14. 1*s.* 3*d.*

(8) 1 sixpence is the amount of tax on £1;
∴ 615 sixpences is the amount of tax on £615.

(9) On £1 the amount of dividend is £$\frac{2}{3}$;
∴ on £375. 15*s.* 9*d.* the amount of dividend is $\frac{2}{3}$ of (£375. 15*s.* 9*d.*), or, £250. 10*s.* 6*d.*

(10) 235*d.* is what remains out of 240*d.*;
1*d.* is what remains out of $\frac{240}{235}$*d.*, or, $\frac{48}{47}$*d.*;
∴ 173900*d.* is what remains out of $\frac{48 \times 173900}{47}$*d.*, or, £740.

(11) On £680 the amount of tax is £19. 16*s*. 8*d*., or, 4760*d*.;
∴ on £1 the amount of tax is $\frac{4760}{680}$*d*., or, 7*d*.

(12) In 1 hour he can travel $\frac{540}{24\times6}$ mi., or, $\frac{15}{4}$ mi.;
∴ in 24 hours he can travel $\frac{15\times24}{4}$ mi., or, 90 mi.

(13) For 1 farthing I can buy $\frac{11}{3795}$ yd., or, $\frac{1}{345}$ yd.;
∴ for 23805 farthings I can buy $\frac{1\times23805}{345}$ yd., or, 69 yd.

(14) On 61152*s*. he can pay (2548 × 21)*s*.;
∴ on 20*s*. he can pay $\frac{2548\times21\times20}{61152}$*s*., or, 17*s*. 6*d*.

(15) Rent of 1 half pole is $\frac{228478}{114239}$*d*., or, 2*d*.;
∴ rent of (70 × 40 × 2) half poles is (70 × 40 × 4)*d*., or, £46. 13*s*. 4*d*.

(16) Size of 1 lb. of ice is $\frac{8}{459}$ cub. ft.;
∴ size of 1 ton of ice is $\frac{8\times20\times112}{459}$ cub. ft., or, $39\frac{19}{459}$ cub. ft.

(17) 5 horses and 132 sheep eat as much as (168 + 132) sheep, or, 300 sheep; 15 horses and 148 sheep eat as much as (252 + 148) sheep, or, 400 sheep. Then 100 sheep will cost $\frac{£50.\ 10s.}{3}$, or, £16. 16*s*. 8*d*. for 8 days.
∴ 400 sheep will cost 4 × (£16. 16*s*. 8*d*.), or, £67. 6*s*. 8*d*. for 8 days.

(18) 1 lb. will cost $\frac{\text{801 halfpence}}{89}$, or, $4\frac{1}{2}$*d*.
∴ 10475 lb. will cost (10475 × $4\frac{1}{2}$)*d*., or, £196. 8*s*. $1\frac{1}{2}$*d*.

(19) He loses $\frac{5}{20}$, or, $\frac{1}{4}$ of his debt;
∴ his debt was 4 × (£150. 10*s*. 6*d*.), or, £602. 2*s*.

(20) If wheat were 1*s*. a quarter the loaf would weigh (3 × 57) lb.;
∴ if wheat were $64\frac{1}{2}$*s*. a quarter the loaf would weigh $\frac{3\times57\times2}{129}$ lb., or, $2\frac{28}{43}$ lb.

(21) £7591 10*s.* = 3643920 halfpence, and £474. 16*s.* $4\frac{1}{2}$*d.*
= 227913 halfpence;
to produce 1 halfpenny in the £ the rate is £$\frac{1}{3643920}$;
∴ to produce 227913 halfpence in the £ the rate is
£$\frac{227913}{3643920}$, or, 1*s.* $3\frac{8}{723}$*d.*

(22) 1 yard of cloth will cost $\frac{21 \times 2}{5}$*s.*;
∴ $183\frac{1}{2}$ yards of cloth will cost $\frac{21 \times 2 \times 367}{5 \times 2}$*s.*, or, £77. 1*s.* $4\frac{4}{5}$*d.*

(23) From 10th of May to 27th of October is 170 days;
wages for 1 day are $\frac{474}{30}$*d.*, or, $\frac{79}{5}$*d.*
wages for 170 days are $\frac{170 \times 79}{5}$*d.*, or, £11. 3*s.* 10*d.*

(24) In one-fifth of the time (15 × 5) men, or, 75 men would be required, and therefore for a piece of work 4 times as large (75 × 4) men, or, 300 men would be required.

(25) Rent of 1 pole is $\frac{71325}{6340}$ halfpence;
∴ rent of 6 acres is $\frac{71325 \times 6 \times 4 \times 40}{6340}$ halfpence, or, £22. 10*s.*

(26) 1 man has provisions for (2100 × 9) months;
∴ 2700 men have provisions for $\frac{2100 \times 9}{2700}$ months, or, 7 months.

(27) 1 man can dig the trench in (63 × 72) days;
42 men can dig the trench in $\frac{63 \times 72}{42}$ days, or, 108 days.
∴ 42 men can dig the trench three times as large in 324 days.

(28) 7*d.* is the income-tax on £1;
∴ 1*d.* is the income tax on £$\frac{1}{7}$;
∴ 3150*d.* is the income tax on £$\frac{3150}{7}$, or, £450.

(29) For 1610*d.* we can buy 322 lb.
∴ for 1*d.* we can buy $\frac{322}{1610}$ lb., or, $\frac{1}{5}$ lb.
∴ for 3570*d.* we can buy $\frac{3570}{5}$ lb., or, 6 cwt. 1 qr. 14 lb.

(30) In 1 day it will take (42 × 36) men to do the work;
∴ in 27 days it will take $\frac{42 \times 36}{27}$ men, or, 56 men;
∴ for twice the work 112 men will be required.

(31) $\frac{1}{8} + \frac{1}{10} = \frac{9}{40}$.
∴ $\frac{31}{40}$ of his income is £473. 13*s*. 1*d*.
∴ his income is $\frac{40}{31}$ of £473. 13*s*. 1*d*., or, £611. 3*s*. 4*d*.

(32) He has 236 pence left out of 240 pence;
he has 1 penny left out of $\frac{240}{236}$*d*., or, $\frac{60}{59}$*d*.
he has 114460 pence left out of $\frac{114460 \times 60}{59}$*d*. or, £485.
∴ his income-tax was (485 × 4)*d*., or, £8. 1*s*. 8*d*.

Ex. (ci), p. 177.

(1) 8 men in 7 days mow 40 acres.
1 man in 7 days mows 5 acres;
1 man in 1 day mows $\frac{5}{7}$ acres;
∴ 24 men in 28 days mow $\frac{5 \times 24 \times 28}{7}$ acres, or, 480 acres.

(2) 8 men for 5 days' work receive £12;
1 man for 5 days' work receives £$\frac{3}{2}$;
1 man for 1 day's work receives £$\frac{3}{10}$.
∴ 32 men for 24 days' work receive £$\frac{32 \times 24 \times 3}{10}$, or, £230. 8*s*.

(3) For 168 days 351 qr. supply 939 men;
for 1 day 351 qr. supply (939 × 168) men;
for 1 day 1 qr. supplies $\frac{939 \times 168}{351}$ men;
for 56 days 1 qr. supplies $\frac{939 \times 168}{56 \times 351}$ men;
for 56 days 1404 qr. supply $\frac{939 \times 168 \times 1404}{56 \times 351}$ men, or, 11268

(4) 8 bushels in 16 days supply 2 horses;
1 bushel in 16 days supplies $\frac{2}{8}$ horse;
1 bushel in 1 day supplies $\frac{2 \times 16}{8}$ horses, or, 4 horses;
3000 qr. in 1 day supply (4 × 3000 × 8) horses;
3000 qr. in 24 days supply $\frac{4 \times 3000 \times 8}{24}$ horses, or, 4000 horses.

(5) (3 × 112) lb. is carried 150 miles for 42*s.*;
1 lb. is carried 150 miles for $\frac{42}{3 \times 112}$*s.*;
1 lb. is carried 1 mile for $\frac{42}{3 \times 112 \times 150}$*s.*
∴ 882 lb. is carried 50 miles for $\frac{882 \times 50 \times 42}{3 \times 112 \times 150}$*s.*, or, £1. 16*s.* 9*d.*

(6) 40 cwt. is carried 6 miles for 10*s.*;
1 cwt. is carried 6 miles for 3*d.*;
1 cwt. is carried 1 mile for $\frac{1}{2}$*d.*;
∴ 257 cwt. is carried 34 miles for $\frac{257 \times 34}{2}$*d.*, or, £18. 4*s.* 1*d.*

(7) For 20 miles (290 × 12)*d.* will pay for 60 cwt.;
for 1 mile (290 × 12)*d.* will pay for (60 × 20) cwt.;
for 1 mile 1*d.* will pay for $\frac{60 \times 20}{290 \times 12}$ cwt., or, $\frac{10}{29}$ cwt.;
for 30 miles 1*d.* will pay for $\frac{10}{30 \times 29}$ cwt., or, $\frac{1}{87}$ cwt.;
for 30 miles 1305*d.* will pay for $\frac{1305}{87}$ cwt., or, 15 cwt.

(8) In 4 days 3 men earn 80*d.*;
in 1 day 3 men earn 20*d.*;
in 1 day 1 man earns $\frac{20}{3}$*d.*;
in 16 days 18 men earn $\frac{16 \times 18 \times 20}{3}$*d.*, or, £8.

(9) 6 persons in 24 days consume 4 bus.;
1 person in 24 days consumes $\frac{4}{6}$ bus.;
1 person in 1 day consumes $\frac{4}{6 \times 24}$ bus.;
∴ 72 persons in 8 days consume $\frac{72 \times 8 \times 4}{6 \times 24}$ bus., or 16 bus.

(10) With 12 hours' daylight he travels 150 mi. in 5 da.;
with 1 hour's daylight he travels 150 mi. in (12 × 5) da.
with 1 hour's daylight he travels 1 mi. in $\frac{12\times5}{150}$ da., or, $\frac{2}{5}$ da.;
with 10 hours' daylight he travels 1 mi. in $\frac{2}{10\times5}$ da., or, $\frac{1}{25}$ da.;
with 10 hours' daylight he travels 500 mi. in $\frac{500}{25}$ da., or, 20 days;

(11) 628 lb. can be carried 150 mi. for 785*d.*;
1 lb. can be carried 150 mi. for $\frac{785}{628}$*d.*, or, $\frac{5}{4}$*d.*;
786 lb. can be carried 150 mi. for $\frac{786\times5}{4}$*d.*;
∴ 4 times 786 lb. will cost (786 × 5)*d.*, or, £16. 7*s.* 6*d.*

(12) For 6 days 312*s.* will pay 16 men;
for 1 day 312*s.* will pay 16 × 6 men;
for 1 day 1*s.* will pay $\frac{16\times6}{312}$ men, or, $\frac{12}{39}$ men;
for 8 days 1*s.* will pay $\frac{12}{8\times39}$ men;
for 8 days 702*s.* will pay $\frac{702\times12}{8\times39}$ men, or, 27 men.

(13) For 50 hours 51*d.* will pay for 5 burners;
for 1 hour 51*d.* will pay for 250 burners;
for 1 hour 1*d.* will pay for $\frac{250}{51}$ burners;
for 60 hours 1*d.* will pay for $\frac{250}{51\times60}$ burners;
for 60 hours 918*d.* will pay for $\frac{250\times918}{51\times60}$ burners, or, 75 burners.

(14) 3 travellers spend £38 in 4 weeks;
1 traveller spends £38 in 12 weeks;
1 traveller spends £1 in $\frac{12}{38}$ week;
5 travellers spend £1 in $\frac{12}{38\times5}$ week;
5 travellers spend £95 in $\frac{12\times95}{38\times5}$ weeks, or, 6 weeks.

(15) 2 horses are kept 5 months for 6415*d.* ;
1 horse is kept 5 months for $\frac{6415}{2}$*d.*
1 horse is kept 1 month for $\frac{1283}{2}$*d.*
3 horses are kept 11 months for $\frac{3 \times 11 \times 1283}{2}$*d.*, or,
£88. 4*s.* $1\frac{1}{2}$*d.*

(16) For 7050*d.* I keep 5 horses for 6 weeks ;
for 1*d.* I keep 5 horses for $\frac{6}{7050}$ week ;
for 1*d.* I keep 1 horse for $\frac{30}{7050}$ week, or, $\frac{1}{235}$ week ;
for 4935*d.* I keep 1 horse for $\frac{4935}{235}$ weeks.
for 4935*d.* I keep 3 horses for $\frac{4935}{235 \times 3}$ weeks, or, 7 weeks.

(17) 5 men reap $12\frac{1}{2}$ ac. in 56 hours ;
1 man reaps $12\frac{1}{2}$ ac. in (56 × 5) hours ;
1 man reaps 1 ac. in $\frac{56 \times 5 \times 2}{25}$ hours ;
7 men reap 1 ac. in $\frac{56 \times 5 \times 2}{25 \times 7}$ hours ;
7 men reap 15 ac. in $\frac{56 \times 5 \times 2 \times 15}{25 \times 7}$ hours, or, 48 hours.
∴ they take $\frac{48}{12}$ days, or, 4 days.

(18) 858 men in 6 months consume 234 qr. ;
1 man in 6 months consumes $\frac{234}{858}$ qr. ;
1 man in 1 month consumes $\frac{234}{858 \times 6}$ qr., or, $\frac{1}{22}$ qr. ;
979 men in $3\frac{1}{2}$ months consume $\frac{979 \times 3\frac{1}{2}}{22}$ qr., or, $155\frac{3}{4}$ qr.

(19) 5 men earn 285*s.* in 6 weeks ;
1 man earns 285*s.* in 5 × 6 weeks ;
1 man earns 1*s.* in $\frac{5 \times 6}{285}$ week ;
4 men earn 1*s.* in $\frac{5 \times 6}{285 \times 4}$ week ;
4 men earn £19 in $\frac{20 \times 19 \times 5 \times 6}{285 \times 4}$ weeks, or, 10 weeks.

(20) 7 men mow 22 ac. in 88 hours ;
1 man mows 22 ac. in (88 × 7) hours ;
1 man mows 1 ac. in 28 hours ;
12 men mow 1 ac. in $\frac{28}{12}$ hours ;
12 men mow 360 ac. in (30 × 28) hours ;
∴ they do the work in $\frac{30 \times 28}{10}$ days, or, 84 days.

(21) 10 horses eat 30 pk. in 7 days ;
1 horse eats 30 pk. in 70 days ;
1 horse eats 1 pk. in $\frac{7}{3}$ days ;
28 horses eat 1 pk. in $\frac{7}{3 \times 28}$ day ;
28 horses eat 120 pk. in $\frac{7 \times 120}{3 \times 28}$ days, or, 10 days.

(22) 300 barrels supply (44 × 30 × 3) rounds for 5 days ;
1 barrel supplies (44 × 30 × 3) rounds for $\frac{1}{60}$ day ;
1 barrel supplies 1 round for $\frac{44 \times 30 \times 3}{60}$ days, or, 66 days ;
400 barrels supply 1 round for (400 × 66) days ;
400 barrels supply (66 × 40 × 5) rounds for $\frac{400 \times 66}{66 \times 40 \times 5}$ days, or, 2 days.

(23) In 54 days 19314*d.* pay 29 men ;
in 1 day 19314*d.* pay (54 × 29) men ;
in 1 day 1*d.* pays $\frac{54 \times 29}{19314}$ man ;
in 12 days 1*d.* pays $\frac{54 \times 29}{19314 \times 12}$ man ;
in 12 days (407 × 20 × 12)*d.* pay $\frac{407 \times 20 \times 12 \times 54 \times 29}{19314 \times 12}$ men, or, 660 men.

(24) For 3 horses for 1 month I pay £18 ;
for 1 horse for 1 month I pay £6 ;
for 4 horses for 5 months I pay £(4 × 5 × 6), or, £120.

Ex. (cli), p. 181.

£	£	£
(1) 2750	(2) 3625	(3) 2700
5	4	$4\frac{1}{2}$
13750	14500	1350
6	8	10800
£825,00	£1160,00	12150
		3
		£364,50
		20
		s. 10,00

£
(4) 8825
4
35300
6½
17650
211800
£2294,50
20
s. 10,00

£ s.
(5) 3256 . 15
4
13027 . 0
5
£651,35 . 0
20
s. 7,00

£ s.
(6) 3265 . 12
4
13062 · 8
5½
6531 . 4
65312 . 0
£718,43 . 4
20
s. 8,64
12
d. 7,68

£
(7) 240
5
1200
7¾
900
8400
£93 00

£ s. d.
(8) 586 . 8 . 10
4¼
146 . 12 . 2·5
2345 . 15 . 4
2492 . 7 . 6·5
3½
1246 . 3 . 9·25
7477 . 2 . 7·5
£87,23 . 6 . 4·75
20
s. 4,66
12
d. 7,9675

Ex. (ciii), p. 183.

(1)
$$\begin{array}{rr} & \pounds \\ & 156 \\ & 4 \\ \hline & 624 \\ & 3 \\ \hline 4\,\big| & 1872 \\ \hline & \pounds 4,68 \\ & 20 \\ \hline s. & 13,60 \\ & 12 \\ \hline d. & 7,20 \end{array}$$

(2)
$$\begin{array}{rr} & \pounds \\ & 280 \\ & 3\frac{1}{2} \\ \hline & 140 \\ & 840 \\ \hline & 980 \\ & 7 \\ \hline 12\,\big| & 6860 \\ \hline & \pounds 5,71.\ 13s.\ 4d. \\ & 20 \\ \hline s. & 14,33 \\ & 12 \\ \hline d. & 4,00 \end{array}$$

(3) Interest for 1 year $= \pounds\frac{400 \times 3\frac{3}{4}}{100} = \pounds 15$;
interest for 3 years $= \pounds 45$;
interest for 35 days $= \frac{35}{365}$ of $\pounds 15 = \frac{7 \times 15}{73} = \pounds 1.\ 8s.\ 9\frac{15}{73}d.$
∴ whole interest $= \pounds 46.\ 8s.\ 9\frac{15}{73}d.$

(4) Interest for 1 year $= \pounds\frac{380 \times 4\frac{3}{4}}{100} = \pounds 18.\ 1s.$;
interest for 3 years $= \pounds 54.\ 3s.$;
interest for 45 days $= \frac{45}{365}$ of $(\pounds 18.\ 1s.) = \pounds 2.\ 4s.\ 6\frac{6}{73}d.$
∴ whole interest $= \pounds 56.\ 7s.\ 6\frac{6}{73}d.$

(5) Interest for 1 year $= \frac{4 \times (\pounds 304.\ 4s.\ 3d.)}{100} = \frac{\pounds 1216.\ 17s.}{100}$;
interest for 8 days $= \frac{8 \times \pounds 1216.\ 17s.}{365 \times 100} = 5s.\ 4\frac{88}{9125}d.$

'6) Interest for 1 year $= \frac{5 \times (\pounds 584.\ 10s.)}{100} = \pounds 29.\ 4s.\ 6d.$;
interest for 42 days $= \frac{42 \times (\pounds 29.\ 4s.\ 6d.)}{365} = \pounds 3.\ 7s.\ 3\frac{33}{365}d.$

(7) Interest for 1 year $= \frac{4\frac{1}{2} \times (£380\ 4s.\ 2d.)}{100}$;

interest for 120 days $= \frac{120 \times 9 \times (£380\ 4s.\ 2d.)}{2 \times 365 \times 100} = £5.\ 12s.\ 6d.$

(8) Interest for 1 year $= \frac{4 \times (£554\ 10s.)}{100} = \frac{£110\ 18s.}{5}$

interest for 3 months $= \frac{£110\ 18s.}{20} = £5.\ 10s.\ 10\frac{4}{5}d.$

(9) Interest for 1 year $= £\frac{700 \times 5\frac{3}{4}}{100} = £40.\ 5s.$;

interest for 2 years $= £80.\ 10s.$;

interest for 51 days $= \frac{51 \times (£40\ 5s.)}{365} = £86.\ 2s.\ 5\frac{55}{73}d.$

(10) Interest for 1 year $= \frac{5 \times (£204\ 17s.\ 7d.)}{100} = \frac{£204\ 17s.\ 7d.}{20}$;

interest for 159 days $= \frac{159 \times (£204\ 17s.\ 7d.)}{365 \times 20} = \frac{£32575\ 15s.\ 9d.}{7300}$

$= £4.\ 9s.\ 2\frac{7180}{7300}d.$

Ex. (civ), p. 184.

(1) Interest = 27289*s.* = £1364. 9*s.*

(2) Interest = 2645*s.* 6*d.* = £132. 5*s.* 6*d.*

(3) Interest = 34569*s.* 9*d.* = £1728. 9*s.* 9*d.*

(4) Interest = 4672*s.* 2½*d.* = £233. 12*s.* 2½*d.*

(5) Interest = 863*s.* 7½*d.* = £43. 3*s.* 7½*d.*

(6) Interest = 4587*s.* 1½*d.* = £229. 17*s.* 1½*d.*

Ex. (cv), p. 185.

(1)

	£	s.	d.
	3587	6	8
	1793	13	4
	£53 81	0	0
	20		
s.	16,20		
	12		
d.	2,40		

(2)

	£	s	d.
	7523	3	4
	3761	11	8
	£112,84	15	0
	20		
s.	16,95		
	12		
d.	11,40		

(3)
$$\begin{array}{rrr} \pounds & s. & d. \\ 8642\ . & 18\ . & 9 \\ 4321\ . & 9\ . & 4 \\ \hline \pounds 129{,}64\ . & 8\ . & 1 \\ 20 & & \\ \hline s.\ 12{,}88 & & \\ 12 & & \\ \hline d.\ 10{,}57 & & \end{array}$$

(4)
$$\begin{array}{rrr} \pounds & s. & d. \\ 6543\ . & 12\ . & 6 \\ 3271\ . & 16\ . & 3 \\ \hline \pounds 98{,}15\ . & 8\ . & 9 \\ 20 & & \\ \hline s.\ 3{,}08 & & \\ 12 & & \\ \hline d.\ 1{,}05 & & \end{array}$$

(5)
$$\begin{array}{rrr} \pounds & s. & d. \\ 37643\ . & 9\ . & 4 \\ 18821\ . & 14\ . & 8 \\ \hline \pounds 564{,}65\ . & 4\ . & 0 \\ 20 & & \\ \hline s.\ 13{,}04 & & \\ 12 & & \\ \hline d.\ \cdot 48 & & \end{array}$$

(6)
$$\begin{array}{rrr} \pounds & s. & d. \\ 72987\ . & 13\ . & 10 \\ 36493\ . & 16\ . & 11 \\ \hline \pounds 1094{,}81\ . & 10\ . & 9 \\ 20 & & \\ \hline s.\ 16{,}30 & & \\ 12 & & \\ \hline d.\ 3{,}69 & & \end{array}$$

Ex. (cvi), p. 186.

(1) Interest on £326 for 1 year $= \frac{\pounds 220.\ 1s.}{15} = \frac{\pounds 73.\ 7s.}{5}$;

∴ interest on £100 for 1 year $= \frac{100}{326} \times \frac{\pounds 73.\ 7s.}{5} = \frac{20 \times 1467s.}{326}$
= £4. 10s.

(2) Interest on £372½ for 1 year $= \frac{\pounds 301.\ 14s.\ 6d.}{18}$;

interest on £100 for 1 year $= \frac{100}{372\frac{1}{2}} \times \frac{6034\frac{1}{2}s.}{18} = \frac{100 \times 12069s.}{745 \times 18}$
= £4. 10s.

(3) Interest on £245 for 9 months = £252. 19s. 3d. − £245
= £7. 19s. 3d.

interest on £245 for 1 year = $\frac{4}{3}$ of £7. 19s. 3d.
= £10. 12s. 4d.;

interest on £100 for 1 year $= \frac{100}{245} \times 212\frac{1}{3}s. = \pounds\frac{13}{3} = \pounds 4\frac{1}{3}$.

(4) Whole amount of interest = £678. 8*s.* – £640 = £38. 8*s.* = 768*s.*;

interest on £640 for 1 year = £$\frac{640 \times 4\frac{1}{2}}{100}$ = £28. 16*s.* = 576*s.*;

∴ number of years = $\frac{768}{576} = \frac{256}{192} = 1\frac{1}{3}$.

(5) Whole amount of interest = £578. 1*s.* 4*d.* – £502. 13*s.* 4*d.* = £75. 8*s.*;

interest on £502$\frac{2}{3}$ for 1 year = £$\frac{502\frac{2}{3} \times 4\frac{1}{2}}{100}$ = £22·62;

∴ number of years = $\frac{75\cdot 4}{22\cdot 62} = 3\cdot\dot{3} = 3\frac{1}{3}$.

(6) Whole amount of interest = £808. 1*s.* 4*d.* – £702. 13*s.* 4*d.* = £105. 8*s.*

interest on £702$\frac{2}{3}$ for 1 year = £$\frac{702\frac{2}{3} \times 4}{100}$ = £$\frac{2108 \times 4}{3 \times 100}$;

∴ number of years = $105\cdot 4 \div \frac{2108 \times 4}{3 \times 100} = \frac{105\cdot 4 \times 3 \times 100}{2108 \times 4} = 3\frac{3}{4}$.

(7) Interest on £100 for 12 years at 4$\frac{1}{2}$ per cent. = £54;

∴ £1 is the interest on £$\frac{100}{54}$;

∴ £202·5 is the interest on £$\frac{202\cdot 5 \times 100}{54}$, or, £375.

(8) Interest on £537$\frac{1}{2}$ for 1 year at 4 per cent. = £21$\frac{1}{2}$;

∴ number of years = $\frac{80\frac{5}{8}}{21\frac{1}{2}} = \frac{645 \times 2}{43 \times 8} = 3\frac{3}{4}$.

(9) Interest on £100 for 5 years at 4$\frac{1}{2}$ per cent. is £22$\frac{1}{2}$;

∴ £1 is the interest on £$\frac{100}{22\frac{1}{2}}$, or, £$\frac{40}{9}$;

∴ £168$\frac{747}{960}$ is the interest on £$(168\frac{747}{960} \times \frac{40}{9})$ = £$\frac{6001}{8}$ = £750. 2*s.* 6*d.*

Ex. (cvii), p. 189.

(1) 1st year's interest $= \pounds\frac{1250\times4}{100} = \pounds\frac{5000}{100} = \pounds50$
2nd year's interest $= \pounds\frac{1300\times4}{100} = \frac{5200}{100} = \pounds52$

$\therefore$ Compound interest $= \pounds102$

(2) 1st year's interest $= \pounds\frac{2500\times3}{100} = \pounds75$
2nd year's interest $= \pounds\frac{2575\times3}{100} = \pounds77.\ 5\text{s.}$

$\therefore$ Compound interest $= \pounds152.\ 5\text{s.}$

(3) 1st year's interest $= \pounds\frac{4000\times5}{100} = \pounds200$
2nd year's interest $= \pounds\frac{4200\times5}{100} = \pounds210$
3rd year's interest $= \pounds\frac{4410\times5}{100} = \pounds220.\ 10\text{s.}$

$\therefore$ Compound interest $= \pounds630.\ 10\text{s.}$

(4) 1st year's interest $= \pounds\frac{5000\times9}{200} = \pounds225$
2nd year's interest $= \pounds\frac{5225\times9}{200} = \pounds235{\cdot}125$
3rd year's interest $= \pounds\frac{5460{\cdot}125\times9}{200} = \pounds245{\cdot}705625$

$\therefore$ Compound interest $= \pounds705{\cdot}830625$
$= \pounds705.\ 16\text{s.}\ 7{\cdot}35\text{d.}$

(5) 1st year's interest $= \pounds\frac{10000\times7}{200} = \pounds350$
2nd year's interest $= \pounds\frac{10350\times7}{200} = \pounds362{\cdot}25$
3rd year's interest $= \pounds\frac{10712{\cdot}25\times7}{200} = \pounds374{\cdot}92875$

$\therefore$ Compound interest $= \pounds1087{\cdot}17875$
$= \pounds1087.\ 3\text{s.}\ 6{\cdot}9\text{d.}$

(6) 1st year's interest $= \pounds\frac{3945\times4}{100} = \pounds157{\cdot}8$
2nd year's interest $= \pounds\frac{4102{\cdot}8\times4}{100} = \pounds164{\cdot}112$
3rd year's interest $= \pounds\frac{4266{\cdot}912\times4}{100} = \pounds170{\cdot}67648$
4th year's interest $= \pounds\frac{4437{\cdot}58848\times4}{100} = \pounds177{\cdot}5035392$

$\therefore$ Compound interest $= \pounds670{\cdot}0920192$
$= \pounds670.\ 1\text{s.}\ 10{\cdot}084608\text{d.}$

(7) 1st year's interest = $\pounds\frac{2746\times4}{100}$ = £109·84
2nd year's interest = $\pounds\frac{2855{\cdot}84\times4}{100}$ = £114·2336
3rd year's interest = $\pounds\frac{2970{\cdot}0736\times4}{100}$ = £118·802944
∴ Compound interest = £342·876544
= £342. 17*s*. 6·37056*d*.

(8) 1st year's interest = $\pounds\frac{4725\times4}{100}$ = £189
2nd year's interest = $\pounds\frac{4914\times4}{100}$ = £196·56
3rd year's interest = $\pounds\frac{5110{\cdot}56\times4}{100}$ = £204·4224
∴ Compound interest = £589·9824
= £589. 19*s*. 7·776*d*.

(9) 1st year's interest = $\pounds\frac{250\times15}{400}$ = £9·375
2nd year's interest = $\pounds\frac{259{\cdot}375\times15}{400}$ = £9·7265625
Principal = £250·
∴ Amount = £269·1015625
= £269. 2*s*. 0·375*d*.

(10) 1st year's interest = $\pounds\frac{150\times4}{100}$ = £6
2nd year's interest = $\pounds\frac{156\times4}{100}$ = £6·24
3rd year's interest = $\pounds\frac{162{\cdot}24\times4}{100}$ = £6·4896
4th year's interest = $\pounds\frac{168{\cdot}7296\times4}{100}$ = £6·749184
Principal = £150·
∴ Amount = £175·478784
= £175. 9*s*. 6·90816*d*.

(11) 1st year's interest = $\pounds\frac{375\times9}{200}$ = £16·875
2nd year's interest = $\pounds\frac{391{\cdot}875\times9}{200}$ = £17·634375
Principal = £375·
∴ Amount = £409·509375
= £409. 10*s*. 2¼*d*.

(12) 1st year's interest = £$\frac{200\times3}{100}$ = £6
2nd year's interest = £$\frac{206\times3}{100}$ = £6·18
3rd year's interest = £$\frac{212{\cdot}18\times3}{100}$ = £6·3654
Principal = £200·

∴ Amount = £218·5454
= £218. 10*s.* 10·896*d.*

(13) 1st year's interest = £$\frac{550\times4}{100}$ = £22
2nd year's interest = £$\frac{572\times4}{100}$ = £22·88
3rd year's interest = £$\frac{594{\cdot}88\times4}{100}$ = £23·7952
$\frac{1}{2}$ year's interest = £$\frac{618{\cdot}6752\times2}{100}$ = £12·373504
Principal = £550·

∴ Amount = £631·048704
= £631. 0*s.* 11·68896*d.*

(14) 1st year's interest = £$\frac{4790\times7}{200}$ = £167·65
2nd year's interest = £$\frac{4957{\cdot}65\times7}{200}$ = £173·51775
$\frac{1}{3}$ year's interest = £$\frac{5131{\cdot}16775\times7}{600}$ = £59·86362375
Principal = £4790·

∴ Amount = £5191·03137375
= £5191. 0*s.* 7·5297*d.*

Ex. (cviii), p. 192.

(1)
£
3745 × 105
18725

393225 × 105
1966125

41288625 × 105
206443125

Amount is £4335·305625

(2) 1st year's interest $= £\frac{7400 \times 5}{200} = £185$

2nd year's interest $= £\frac{7585 \times 5}{200} = £189{\cdot}625$

3rd year's interest $= £\frac{7774{\cdot}625 \times 5}{200} = £194{\cdot}365625$

$$\begin{array}{r} \text{Principal} = £7400{\cdot} \\ \hline \therefore\ \text{Amount} = £7968{\cdot}990625 \end{array}$$

(3)

$$\begin{array}{ll} \multicolumn{1}{l}{£} & \\ 34690 & \times\ 104 \\ \ \ 138760 & \\ \hline 3607760 & \times\ 104 \\ \ \ 14431040 & \\ \hline 375207040 & \times\ 104 \\ \ \ 1500828160 & \\ \hline \end{array}$$

Amount is £39021·532160

(4)

$$\begin{array}{ll} \multicolumn{1}{l}{£} & \\ 475{\cdot}75 & \times\ 103 \\ \ \ 142725 & \\ \hline 49002{\cdot}25 & \times\ 103 \\ \ \ 14700675 & \\ \hline \end{array}$$

Amount is £504·723175

(5)

$$\begin{array}{ll} \multicolumn{1}{l}{£} & \\ 4264{\cdot}35 & \times\ 104 \\ \ \ 1705740 & \\ \hline 443492{\cdot}40 & \times\ 104 \\ \ \ 17739696 & \\ \hline 46123209{\cdot}6 & \times\ 104 \\ \ \ 18449283840 & \\ \hline \end{array}$$

Amount is £4796·8137984

Ex. (cix), p. 193.

(1) 1st half-year's interest = $\pounds\frac{2500\times2}{100}$ = £50
2nd half-year's interest = $\pounds\frac{2550\times2}{100}$ = £51
3rd half-year's interest = $\pounds\frac{2601\times2}{100}$ = £52·02
4th half-year's interest = $\pounds\frac{2653\cdot02\times2}{100}$ = £53·0604
Principal = £2500·
∴ Amount = £2706·0804

(2)
1st half-year's int. = $\pounds\frac{6000\times5}{200}$ = £150
2nd half-year's int. = $\pounds\frac{6150\times5}{200}$ = £153·75
3rd half-year's int. = $\pounds\frac{6303\cdot75\times5}{200}$ = £157·59375
4th half-year's int. = $\pounds\frac{6461\cdot34375\times5}{200}$
= £161·53359375
5th half-year's int. = $\pounds\frac{6622\cdot87734375\times5}{200}$
= £165·57193359375
6th hf.-yr's int. = $\pounds\frac{6788\cdot44927734375\times5}{200}$
= £169·71123193359375
Principal = £6000·
∴ Amount = £6958·16050927734375

(3)
1st half-year's interest = $\pounds\frac{2745\times3}{200}$ = £41·175
2nd half-year's int. = $\pounds\frac{2786\cdot175\times3}{200}$ = £41·792625
3rd half-year's int. = $\pounds\frac{2827\cdot967625\times3}{200}$ = £42·419514375
4th hf.-yr.'s int. = $\pounds\frac{2870\cdot387139375\times3}{200}$ = £43·055807090625
Principal = £2745·
∴ Amount = £2913·442946465625

Ex. (cx), p. 195.

(1) Interest on £100 for 4 years at 5 per cent. = £20 ;
∴ P. W. = $\frac{100}{120}$ × (£5520) = £4600.

(2) Interest on £100 for 5 years at 3 per cent. = £15 ;
∴ P. W. = $\frac{100}{115}$ × (£3171. 14*s.*) = £2758.

(3) Interest on £100 for $3\frac{1}{2}$ years at 4 per cent. = £14 ;
∴ P. W. = $\frac{100}{114}$ × (£826. 10*s.*) = £725.

(4) Interest on £100 for 5 years at 4 per cent. = £20 ;
∴ P. W. = $\frac{100}{120}$ × (£416. 2*s.*) = £346. 15*s.*

(5) Interest on £100 for 4 years at $3\frac{1}{2}$ per cent. = £14 ;
∴ P. W. = $\frac{100}{114}$ × £8949 = £7850.

(6) Interest on £100 for 5 years at 3 per cent. = £15 ;
∴ P. W. = $\frac{100}{115}$ × (£8314. 10*s.*) = £7230 ;
∴ discount = £8314. 10*s.* − £7230 = £1084. 10*s.*

(7) Interest on £100 for $3\frac{1}{2}$ years at 3 per cent. = £$10\frac{1}{2}$;
∴ P. W. = $\frac{100}{110\frac{1}{2}}$ × (£930. 19*s.* 3*d.*) = £842. 10*s.* ;
∴ discount = £930. 19*s.* 3*d.* − £842. 10*s.* = £88. 9*s.* 3*d.*

(8) Interest on £100 for 3 years at 5 per cent. = £15 ;
∴ P. W. = $\frac{100}{115}$ × (£876. 10*s.* $8\frac{1}{4}$*d.*) = £762. 4*s.* $0\frac{21}{23}$*d.* ;
∴ discount = £876. 10*s.* $8\frac{1}{4}$*d.* − £762. 4*s.* $0\frac{21}{23}$*d.*
= £114. 6*s.* $7\frac{31}{92}$*d.*

(9) Interest on £100 for $4\frac{1}{2}$ years at $3\frac{1}{2}$ per cent. = £$(\frac{9}{2} \times \frac{7}{2})$
= £$15\frac{3}{4}$;
∴ P. W. = $\frac{100}{115\frac{3}{4}}$ × £5556 = £4800 ;
∴ discount = £5556 − £4800 = £756.

(10) Interest on £100 for $3\frac{3}{4}$ years at 4 per cent. = £15 ;
∴ P. W. = $\frac{100}{115}$ × (£618. 2*s.* 6*d.*) ≐ £537. 10*s.* ;
∴ discount = £618. 2*s.* 6*d.* − £537. 10*s.* = £80. 12*s.* 6*d.*

Ex. (cxi), p. 196.

(1) Interest on £100 for $1\frac{1}{2}$ years at 4 per cent. = £6 ;
∴ P. W. = $\frac{100}{106}$ × (£388. 17*s.* 9*d.*) = £366. 17*s.* 6*d.* ;
∴ discount = £388. 17*s.* 9*d.* − £366. 17*s.* 6*d.*
= £22. 0*s.* 3*d.*

(2) Interest on £100 for $\frac{3}{4}$ year at $3\frac{1}{2}$ per cent. = £$2\frac{5}{8}$;
∴ P. W. = $\frac{100}{102\frac{5}{8}}$ × £5747 = £5600.

(3) Interest on £100 for $\frac{7}{12}$ year at $4\frac{1}{2}$ per cent. = £$2\frac{5}{8}$;
∴ P. W. = $\frac{100}{102\frac{5}{8}}$ × £10673 = £10400.

(4) £16. 1*s.* $10\frac{1}{2}$*d.* − 12*s.* $10\frac{1}{2}$*d.* = £15. 9*s.*
∴ interest for a year on £15. 9*s.* is 12*s.* $10\frac{1}{2}$*d.* ;
∴ interest for a year on £100 = $\frac{100}{15\frac{9}{20}}$ × (12*s.* $10\frac{1}{2}$*d.*)
= £$4\frac{1}{6}$.

(5) Interest on £100 for $\frac{1}{2}$ year at 8 per cent. = £4 ;
∴ P. W. = $\frac{100}{104}$ × (£196. 4*s.* $4\frac{1}{2}$*d.*) = £188. 13*s.* $5\frac{1}{4}$*d.* ;
∴ discount = £196. 4*s.* $4\frac{1}{2}$*d.* − £188. 13*s.* $5\frac{1}{4}$*d.*
= £7. 10*s.* $11\frac{1}{4}$*d.*

(6) Interest on £100 for $\frac{2}{3}$ year at 6 per cent. = £4 ;
∴ P. W. = $\frac{100}{104}$ × (£78. 9*s.* 9*d.*) = £75. 9*s.* $4\frac{1}{2}$*d.* ;
∴ discount = £78. 9*s.* 9*d.* − £75. 9*s.* $4\frac{1}{2}$*d.* = £3. 0*s.* $4\frac{1}{2}$*d.*

(7) Interest on £100 for $\frac{3}{4}$ year at $4\frac{1}{3}$ per cent. = £$3\frac{1}{4}$;

∴ P. W. = $\frac{100}{103\frac{1}{4}}$ × (£252. 19*s*. 3*d*.) = £245.

(8) Interest on £100 for $4\frac{4}{9}$ years at $4\frac{1}{2}$ per cent. = £20;

∴ P. W. = $\frac{100}{120}$ × (£151. 17*s*. 6*d*.) = £126. 11*s*. 3*d*.;

∴ discount = £151. 17*s*. 6*d*. − £126. 11*s*. 3*d*

= £25. 6*s*. 3*d*.

(9) Interest on £100 for $\frac{4}{3}$ year at $4\frac{1}{2}$ per cent. = £6;

∴ P. W. = $\frac{100}{106}$ × (£678. 8*s*.) = £640.

(10) £275. 6*s*. 8*d*. − £13. 2*s*. $2\frac{2}{3}$*d*. = £262. 4*s*. $5\frac{1}{3}$*d*.;

∴ interest for 15 months on £262. 4*s*. $5\frac{1}{3}$*d*. is £13. 2*s*. $2\frac{2}{3}$*d*.;

∴ interest for 15 months on £100 is $\frac{100}{262\frac{2}{9}}$ of £$13\frac{1}{9}$ = £5;

∴ interest for 12 months on £100 is £4.

(11) Interest on £100 for $3\frac{1}{3}$ years at $4\frac{1}{2}$ per cent. = £15;

∴ P. W. = $\frac{100}{115}$ × (£578. 1*s*. 4*d*.) = £502. 13*s*. 4*d*.

(12) Interest on £100 for $2\frac{1}{4}$ years at $2\frac{2}{3}$ per cent. = £6;

∴ P. W. = $\frac{100}{106}$ × (£574. 3*s*. 4*d*.) = £541. 13*s*. 4*d*.;

∴ discount = £574. 3*s*. 4*d*. − £541. 13*s*. 4*d*. = £32. 10*s*.

(13) Interest on £100 for $3\frac{3}{4}$ years at 4 per cent. = £15;

∴ P. W. = $\frac{100}{115}$ × (£808. 1*s*. 4*d*.) = £702. 13*s*. 4*d*.

(14) Interest = £$\frac{750\frac{5}{6} \times 2\frac{1}{2} \times 2\frac{2}{5}}{100}$ = £$\frac{4505}{100}$ = £45. 1*s*.;

interest on £100 for $2\frac{1}{2}$ years at $2\frac{2}{5}$ per cent. = £6;

∴ P. W. = $\frac{100}{106}$ × £$750\frac{5}{6}$ = £708. 6*s*. 8*d*.;

∴ discount = £750. 16*s*. 8*d*. − £708. 6*s*. 8*d*. = £42. 10*s*.;

∴ difference = £45. 1*s*. − £42. 10*s*. = £2. 11*s*.

(15) £20. 5*s*. $6\frac{3}{4}$*d*. − £19. 6*s*. 3*d*. = 19*s*. $3\frac{3}{4}$*d*.;

∴ interest for 1 year on £$19\frac{5}{16}$ is 19*s*. $3\frac{3}{4}$*d*.;

∴ interest on £100 for 1 year = $\frac{100 \times 16}{309} \times$ (19*s*. $3\frac{3}{4}$*d*.) = £5.

(16) Interest = £$\dfrac{313\frac{19}{20} \times \frac{2}{3} \times 6}{100}$ = £$\frac{6279}{500}$ = £12. 11*s*. $1\frac{23}{25}$*d*.;

interest on £100 for $\frac{2}{3}$ year at 6 per cent. = £4;

∴ P. W. = $\frac{100}{104} \times$ (£313. 19*s*.) = £301. 17*s*. 6*d*.;

∴ discount = £313. 19*s*. − £301. 17*s*. 6*d*. = £12. 1*s*. 6*d*.;

∴ difference = £12. 11*s*. $1\frac{23}{25}$*d*. − £12. 1*s*. 6*d*. = 9*s*. $7\frac{23}{25}$*d*.

Ex. (cxii), p. 197.

(1) Compound interest on £100 = £15. 15*s*. 3*d*.;

∴ P. W. = $\dfrac{100}{115\frac{61}{80}} \times$ (£6945. 15*s*.) = £6000.

(2) Compound interest on £100 = £$6\frac{9}{100}$;

∴ P. W. = $\dfrac{100}{106\frac{9}{100}} \times$ (£4774. 1*s*.) = £4500;

∴ discount = £4774. 1*s*. − £4500 = £274. 1*s*.

(3) Compound interest on £100 = $108\frac{4}{25}$;

∴ P. W. = $\dfrac{100}{108\frac{4}{25}} \times$ £100 = £92. 9*s*. $1\frac{59}{169}$*d*.;

∴ discount = £100 − £92. 9*s*. $1\frac{59}{169}$*d*. = £7. 10*s*. $10\frac{110}{169}$*d*.

(4) Compound interest on £100 = £15. 15*s*. 3*d*. = 3783*d*.;

also, £165. 10*s*. $1\frac{1}{2}$*d*. = $39721\frac{1}{2}$*d*.;

∴ sum required = £$\dfrac{39721\frac{1}{2} \times 100}{3783}$ = £(21 × 50) = £1050.

(5) P. D. = £$\frac{240 \times 29}{365}$ = £$\frac{1392}{73}$ = £19. 1*s*. 4*d*. nearly.

(6) P. D. = £$\frac{120 \times 52}{365}$ = £$\frac{1248}{73}$ = £17. 1*s*. 11*d*. nearly.

(7) P. D. = $£\frac{120 \times 7}{365} = £\frac{148}{73} = £2.$ 6*s.* nearly.

(8) P. D. = $£\frac{70 \times 28}{365} = £\frac{14 \times 28}{73} = £5.$ 7*s.* 4*d.* nearly.

(9) P. D. = $£\frac{55 \times 7}{365} = £\frac{77}{73} = £1.$ 1*s.* 1*d.* nearly.

(10) P. D. = $£\frac{90 \times 18}{365} = £\frac{324}{73} = £4.$ 8*s.* 9*d.* nearly.

(11) P. D. = $£\frac{90 \times 75}{365} = £\frac{18 \times 75}{73} = £18.$ 9*s.* 10*d.* nearly.

Ex. (cxiii), p. 199.

(1) $$\frac{14 + 26 + 9 + 18 + 13 + 24 + 27 + 39}{8} = \frac{170}{8} = 21\cdot25.$$

(2) $$\frac{1600 + 276 + 974 + 0 + 236 + 845 + 1239}{7} = \frac{5170}{7}$$
$$= 738\cdot\dot{5}7142\dot{8}.$$

(3) $$\frac{34729 + 46238 + 87296}{3} = \frac{168263}{3} = 56087\cdot\dot{6}.$$

(4) $$\frac{15\cdot5 + 36\cdot75 + 17\cdot625 + 0 + 10\cdot375 + 74\cdot2 + 28\cdot25 + 33}{8}$$
$$= \frac{215\cdot7}{8} = 26\cdot9625.$$

(5) $$\frac{12\cdot48 + 21 + 7\cdot75 + \cdot034 + 3\cdot125 + 0 + 24\cdot5 + 12\cdot35}{8}$$
$$= \frac{81\cdot239}{8} = 10\cdot154875.$$

Ex. (cxiv), p. 200.

(1) Commission = $£\frac{133\frac{1}{2} \times 2\frac{1}{2}}{100} = £\frac{267 \times 5}{400} = £3.$ 6*s.* 9*d.*

(2) Insurance = $£\frac{625 \times \frac{1}{8}}{100} = £\frac{25}{32} =$ 15*s.* 7½*d.*

(3) Insurance = £$\frac{8350 \times 84}{100 \times 20}$ = £$\frac{3507}{10}$ = £350. 14*s.*

(4) Brokerage = £$\frac{852 \cdot 5 \times 3}{800}$ = £3·196875 = £3. 3*s.* 11$\frac{1}{4}$*d.*

(5) Insurance = £$\frac{4270 \times 7}{200}$ = £149·45 = £149. 9*s.*

(6) Brokerage = $\frac{3 \times (£1508\ 17s.\ 10d.)}{200}$ = $\frac{£4526\ 13s.\ 6d.}{200}$
$\doteq$ £22. 12*s.* 8·01*d.*

(7) 2400*s.* = £120. (8) 3475*s.* = £173. 15*s.*

(9) 4234*s.* 6*d.* = £211. 14*s.* 6*d.*

(10) 3275*s.* 9*d.* = £163. 15*s.* 9*d.* (11) 2150*s.* = £107. 10*s.*

(12) 1739*s.* 6*d.* = £86. 19*s.* 6*d.*

(13) 2618*s.* 3*d.* = £130. 18*s.* 3*d.*

(14) 2139*s.* 4$\frac{1}{2}$*d.* = £106. 19*s.* 4$\frac{1}{2}$*d.*

(15) £24·5 = £24. 10*s.* (16) £827·6 = £827. 12*s.*

(17) £32·45 = £32. 9*s.* (18) £72·875 = £72. 17*s.* 6*d.*

(19) £$\frac{40}{8}$ = £5. (20) £$\frac{76}{8}$ = £9. 10*s.*

(21) £$\frac{92 \cdot 5}{8}$ = £11. 11*s.* 3*d.* (22) £$\frac{103 \cdot 75}{8}$ = £12. 19*s.* 4$\frac{1}{2}$*d.*

Ex. (cxv), p. 202.

(1) On 16*s.* I gain 4*s.*;
∴ on 100*s.* I gain $\frac{100 \times 4}{16}$*s.* or 25*s.*

(2) Cost price of £112 worth was £100;
∴ cost price of £560 worth was £$\frac{560 \times 100}{112}$, or, £500.

(3) Cost price = $\frac{100}{120}$ × £490 = £$\frac{5 \times 245}{3}$;
∴ cost per yard = £$\frac{5 \times 245}{3 \times 375}$ = £$\frac{49}{45}$ = £1. 1*s.* 9$\frac{1}{3}$*d.*

(4) Cost price per gall. $= \frac{100}{95}$ of (17*s.* 5*d.*) $= 20 \times 11$*d.* $= 220$*d.* ;
$\therefore$ selling price per gall. $= \frac{115}{100}$ of 220*d.* = £1. 1*s.* 1*d.*

(5) Cost price $= \frac{100}{84}$ of £136 $=$ £$\frac{3400}{21}$ $=$ £$161\frac{19}{21}$;
$\therefore$ I gain on £$161\frac{19}{21}$ £$(168 - 161\frac{19}{21})$, or, £$6\frac{2}{21}$;
$\therefore$ I gain £$\frac{128 \times 100}{3400}$, or, £$3\frac{3}{17}$ per cent.

(6) On an outlay of $1\frac{1}{2}$*d.* he gains $\frac{1}{2}$*d.* ;
$\therefore$ on 100*d.* he gains $\frac{100}{3}$*d.*, or, $33\frac{1}{3}$*d.* per cent.

(7) On an outlay of £100 he sells the goods for £120 ;
the customer pays him $\frac{9}{10}$ of £120, or, £108 ;
$\therefore$ he gains £8 on an outlay of £100.

(8) On an outlay of £100 he sells the goods for £125 ;
the customer pays him $\frac{88}{100}$ of £125, or, £110 ;
$\therefore$ he gains £10 on an outlay of £100.

(9) On an outlay of £23. 5*s.* 5*d.* he loses £1. 3*s.* $3\frac{1}{4}$*d.* ;
$\therefore$ on an outlay of £100 he loses $\frac{100 \times 20 \times 12}{5585} \times$ (£1. 3*s.* $3\frac{1}{4}$*d.*)
or, £5.

(10) On an outlay of £15. 6*s.* 3*d.* he loses £3. 10*s.* $5\frac{1}{4}$*d.* ;
$\therefore$ on an outlay of £100 he loses $\frac{100 \times 20 \times 12}{3675} \times$ (£3. 10*s.* $5\frac{1}{4}$*d.*)
or, £23.

(11) He buys 112 lb. for £24 ;
$\therefore$ he buys 6144 lb. for £$\frac{6144 \times 24}{112}$, or, £$\frac{9216}{7}$;
$\therefore$ he gains £1500 $-$ £$\frac{9216}{7}$, or, £$\frac{1284}{7}$ on an outlay of £$\frac{9216}{7}$;
$\therefore$ he gains per cent. £$(\frac{100}{9216} \times 1284)$, or, £13. 18*s.* $7\frac{3}{4}$*d.*

(12) Cost price $= \frac{100}{108} \times$ (£1031. 8*s.*) $=$ £955 ;
$\therefore$ on an outlay of £955 he gains £$(1050\frac{1}{2} - 955)$. or £$95\frac{1}{2}$;
$\therefore$ on an outlay of £100 he gains £$\frac{100 \times 95 \cdot 5}{955}$, or, £10.

(13) An increase of £2. 5*s*. on cost price increases the gain 3 per cent.

an increase of £$\frac{2\frac{1}{4}\times 100}{3}$ on cost price increases the gain 100 per cent.;

∴ cost price = £$\frac{9\times 100}{4\times 3}$ = £75.

(14) Cost price = 12 × (2*s*. 6½*d*.) + 4 × (3*s*. 2¼*d*.) = 43*s*. 3*d*.;
he sells it for 43*s*. 3*d*. + ⅓ of (43*s*. 3*d*.) = 57*s*. 8*d*.;
∴ selling price per lb. = $\frac{57s.\ 8d.}{16}$ = 3*s*. 7¼*d*.

(15) average cost per lb. = ¾ of (7*s*. 10*d*.) = 5*s*. 10½*d*.;
now $\frac{6s.\ 6d. + 5s.\ 3d.}{2} = \frac{11s.\ 9d.}{2}$ = 5*s*. 10½*d*.;
∴ he must have the same quantity at 5*s*. 3*d*. as that which he has at 6*s*. 6*d*., that is, 4 lb.

(16) Cost price = (80 × 18*s*.) + (180 × 15*s*.) = 4140*s*.;
selling price = 4140*s*. + $\frac{4140}{12}$*s*. = 4485*s*.;
selling price per gall. = $\frac{4485}{260}$*s*. = 17*s*. 3*d*.

(17) Cost price = 80 × (15*s*. 6*d*.) + 96 × (17*s*. 1*d*.) = 2880*s*.;
selling price = 2880*s*. + 288*s*. = 3168*s*.;
selling price per gall. = $\frac{3168}{176}$*s*. = 18*s*.

(18) Cost price of 4 lb. of mixture = 9*s*. 3*d*. + 2*s*. 9*d*. = 12*s*.;
gain on outlay of 12*s*. = 16*s*. − 12*s*. = 4*s*.;
∴ he gains ⅓ of his outlay, or, 33⅓ per cent.

Ex. (cxvi), p. 206.

(1) Purchase-money = £$\frac{3850\times 92}{100}$ = £3542.

(2) Purchase-money = £$\frac{475\times 93}{100}$ = £441. 15*s*.

(3) Purchase-money = £$\frac{572\cdot 5\times 91\cdot 5}{100}$ = £523. 16*s*. 9*d*.

(4) Stock = £$\frac{2199\times 100}{91\frac{5}{8}}$ = £$\frac{2199\times 100\times 8}{733}$ = £2400.

(5) Stock = $£\frac{5527 \cdot 5 \times 100}{92\frac{1}{8}} = £\frac{55275 \times 10 \times 8}{737} = £6000.$

(6) Stock = $£\frac{717\frac{107}{240} \times 100}{92\frac{3}{8}} = £\frac{172187 \times 100 \times 8}{739 \times 240} = £776.$ 13*s.* 4*d.*

(7) Income = $£\frac{3725 \times 3}{100 \times 2} = £\frac{111 \cdot 75}{2} = £55 \cdot 875 = £55.$ 17*s.* 6*d.*

(8) Income = $£\frac{375 \times 3}{100 \times 2} = £\frac{11 \cdot 25}{2} = £5 \cdot 625 = £5.$ 12*s.* 6*d.*

(9) Income = $£\frac{1406 \cdot 25 \times 3}{100 \times 2} = £\frac{42 \cdot 1875}{2} = £21 \cdot 09375$
= £21. 1*s.* $10\frac{1}{2}$*d.*

Ex. (cxvii), p. 209.

(1) Money produced by sale of £3200 stock = $£\frac{3200 \times 86\frac{1}{4}}{100}$
= £2760;
stock purchased with £2760 = $£\frac{2760 \times 100}{115} = £2400$;
1st income = $£\frac{3200 \times 3}{100} = £96$;
2nd income = $£\frac{2400 \times 4}{100} = £96$;
∴ no alteration is made.

(2) Stock purchased with £5151 = $£\frac{5151 \times 100}{101} = £5100$;
money produced by sale of £5100 stock = $£\frac{5100 \times 105}{100}$
= £5355;
Stock purchased with £5355 = $£\frac{5355 \times 100}{102} = £5250$;
1st income = $£\frac{5100 \times 5}{100} = £255$;
2nd income = $£\frac{5250 \times 4\frac{3}{4}}{100} = £249.$ 7*s.* 6*d.*;
∴ loss in income = £5. 12*s.* 6*d.*

(3) Money produced by sale of £4800 stock = $£\frac{4800 \times 93}{100}$
= £4464;
stock purchased with £4464 = $£\frac{4464 \times 100}{108} = £\frac{12400}{3}$;
1st income = $£\frac{4800 \times 3}{100} = £144$;
2nd income = $£\frac{12400 \times 6}{3 \times 100} = £248$;
∴ increase in income = £104.

(4) Money from sale of £4500 stock = £$\frac{4500 \times 112 \cdot 5}{100}$
$= £(45 \times 112 \cdot 5)$;
1st income = £$\frac{4500 \times 5}{100}$ = £225;
2nd income = £225 + £168. 15*s.* = £393. 15*s.*;
amount of Egyptian stock = £$\frac{393 \cdot 75 \times 100}{7}$ = £5625;
∴ Price per £100 = £$\frac{45 \times 112 \cdot 5 \times 100}{5625}$ = £90.

(5) Money from sale of £2000 stock = £$\frac{2000 \times 94 \cdot 5}{100}$ = £1890;
1st income = £$\frac{1890 \times 6}{126}$ = £90;
2nd income = £$\frac{1890 \times 9}{210}$ = £81;
∴ difference of income is £9.

(6) £1080 income is produced by investing £32850;
£1 income is produced by investing £$\frac{32850}{1080}$;
£3 income is produced by investing £$\frac{3 \times 32850}{1080}$, or,
£91$\frac{1}{4}$.

(7) Money from sale of stock = £(50 × 92·5) = £4625;
stock purchased with £4625 = £$\frac{4625 \times 100}{88 \cdot 8}$;
1st income = £$\frac{5000 \times 3}{100}$ = £150;
2nd income = £$\frac{4625 \times 3}{88 \cdot 8}$ = £$\frac{46250}{296}$ = £156. 5*s.*;
∴ increase of income is £6. 5*s.*

(8) £3$\frac{1}{2}$ is produced by investing £106$\frac{3}{4}$;
£1 is produced by investing £$\frac{106\frac{3}{4}}{3\frac{1}{2}}$;
£120$\frac{3}{5}$ is produced by investing £$\frac{106\frac{3}{4} \times 120\frac{3}{5}}{3\frac{1}{2}}$, or, £3678. 6*s.*

(9) Gross income = £$\frac{6050 \times 3}{90 \cdot 75}$ = £200;
net income = £200 − 800*d.* = £200 − £3. 6*s.* 8*d.*
= £196. 13*s.* 4*d.*

(10) $\pounds 3\frac{1}{2} - \pounds\frac{49}{480} = \pounds\frac{1631}{480}$;
for an income of $\pounds\frac{1631}{480}$ I must invest £91;
for an income of £1 I must invest $\pounds\frac{91 \times 480}{1631}$;
for an income of £932 I must invest $\pounds\frac{932 \times 91 \times 480}{1631}$, or, £24960.

(11) Stock purchased in 3 per cents. $= \pounds\frac{2075 \times 100}{20 \cdot 75} = \pounds 10000$;
money from sale of this stock $= \pounds(91 \times 100) = \pounds 9100$;
stock purchased in $3\frac{1}{2}$ per cents. $= \pounds\frac{9100 \times 100}{97 \cdot 5}$
$= \pounds\frac{28000}{3}$;
1st income $= \pounds\frac{10000 \times 3}{100} = \pounds 300$;
2nd income $= \pounds\frac{28000 \times 7}{100 \times 3 \times 2} = \pounds 326$. 13*s*. 4*d*.;
∴ increase in income is £26. 13*s*. 4*d*.

(12) £1 invested in the 1st stock gives an income of $\pounds\frac{6}{126}$, or, $\pounds\frac{1}{21}$;
£1 invested in the 2nd stock gives an income of $\pounds\frac{9}{210}$, or, $\pounds\frac{3}{70}$;
∴ $\pounds(\frac{1}{21} - \frac{3}{70})$, or, $\pounds\frac{1}{210}$ is the difference of income for £1 invested;
∴ for a difference of $\pounds 22\frac{1}{2}$, I must invest $\pounds(22\frac{1}{2} \div \frac{1}{210})$, or, £4725.

(13) £96 invested in 3 per cents. produces £3 income;
£96 invested in the railway stock produces $\pounds\frac{5 \times 96}{100}$, or, £4·8 income;
∴ increase is £1·8.

Ex. (cxviii), p. 213.

(1) $\left.\begin{array}{l} \frac{2}{5} = \frac{2 \times 9}{5 \times 9} = \frac{18}{5 \times 9} \\ \frac{4}{9} = \frac{4 \times 5}{9 \times 5} = \frac{20}{9 \times 5} \end{array}\right\}$ ∴ $\frac{4}{9}$ is the greater.

(2) $\left.\begin{array}{l} \frac{17}{39} = \frac{17 \times 41}{39 \times 41} = \frac{697}{39 \times 41} \\ \frac{19}{41} = \frac{19 \times 39}{41 \times 39} = \frac{741}{41 \times 39} \end{array}\right\}$ ∴ $\frac{19}{41}$ is the greater.

(3) $$\left.\begin{aligned} \tfrac{4}{7} &= \tfrac{4\times15\times8}{7\times15\times8} = \tfrac{480}{7\times15\times8} \\ \tfrac{8}{15} &= \tfrac{8\times7\times8}{15\times7\times8} = \tfrac{448}{7\times15\times8} \\ \tfrac{13}{24} &= \tfrac{13\times7\times5}{7\times15\times8} = \tfrac{455}{7\times15\times8} \end{aligned}\right\} \begin{aligned} &\therefore \tfrac{4}{7} \text{ is the greatest,} \\ &\text{and } \tfrac{8}{15} \text{ is the least.} \end{aligned}$$

(4) $\frac{5}{7} \times \frac{13}{15} \times \frac{21}{91} \times \frac{45}{52} = \frac{5\times13\times21\times45}{7\times15\times91\times52} = \frac{45}{364} = 45 : 364.$

(5) Number required $= \frac{7\times15}{3} = 21.$

(6) Number required $= \dfrac{\frac{4}{7} \times \frac{5}{9}}{\frac{2}{3}} = \frac{4\times5\times3}{7\times9\times2} = \frac{10}{21}.$

(7) Number required $= \frac{\cdot16\times\cdot09}{\cdot3} = \cdot16 \times \cdot3 = \cdot048.$

(8) Mean proportional $= \sqrt{14 \times 56} = \sqrt{\quad 4} = 28.$

(9) Mean proportional $= \sqrt{\frac{5\times35}{63\times81}} = \sqrt{\frac{5\times5}{9\times81}} = \frac{5}{27}.$

(10) Mean proportional $= \sqrt{\cdot057 \times \cdot513} = \sqrt{\cdot029241}$
$= \cdot171.$

(11) $B = \frac{5}{26}$ of C;
$\therefore$ $A = \frac{10}{3}$ of $\frac{5}{26}$ of $C = \frac{25}{39}$ of C.

(12) B's share $= \frac{5}{6}$ of A's share;
C's share $= \frac{3}{4}$ of B's share $= \frac{3}{4}$ of $\frac{5}{6}$ of A's share;
D's share $= \frac{2}{3}$ of C's share $= \frac{2}{3}$ of $\frac{3}{4}$ of $\frac{5}{6}$ of A's share;
$\therefore$ A's share $+ \frac{5}{6}$ of A's share $+ \frac{5}{8}$ of A's share $+ \frac{5}{12}$ of A's share $=$ £1587;
$\therefore$ $(1 + \frac{5}{6} + \frac{5}{8} + \frac{5}{12})$ of A's share $=$ £1587;
$\therefore$ $\frac{24+20+15+10}{24}$ of A's share $=$ £1587;
$\therefore$ $\frac{69}{24}$ of A's share $=$ £1587;
$\therefore$ A's share $=$ £$\frac{24\times1587}{69}$ $=$ £552;
$\therefore$ B's share $= \frac{5}{6}$ of £552 $=$ £460;
$\therefore$ C's share $= \frac{3}{4}$ of £460 $=$ £345;
$\therefore$ D's share $= \frac{2}{3}$ of £345 $=$ £230.

Ex. (cxix), p. 215.

(1) £60 ÷ (11 + 9) = £60 ÷ 20 = £3;
∴ the parts are £33 and £27.

(2) £2500 ÷ (2 + 3 + 7 + 8) = £2500 ÷ 20 = £125;
∴ the parts are £250, £375, £875, and £1000.

(3) The common denominator of the fractions is 60, and we have therefore to divide £8470 into parts proportional to 30, 20, 15, and 12.
Then £8470 ÷ (30 + 20 + 15 + 12 = £110;
∴ the parts are £3300, £2200, £1650, and £1320.

(4) 75 + 10 + 15 = 100;
∴ amount of saltpetre = $\frac{75}{100}$ of 12 cwt. = 9 cwt.;
amount of sulphur = $\frac{10}{100}$ of 12 cwt. = 1 cwt. 22$\frac{2}{5}$ lb.;
amount of charcoal = $\frac{15}{100}$ of 12 cwt. = 1 cwt. 3 qr. 5$\frac{3}{5}$ lb.

(5) 3 + 4 + 5 = 12;
∴ length of first side = $\frac{3}{12}$ of 480 yd. = 120 yd.;
length of second side = $\frac{4}{12}$ of 480 yd. = 160 yd.;
length of third side = $\frac{5}{12}$ of 480 yd. = 200 yd.

(6) *A* gets 3 times *B*'s share;
C gets 4 times *B*'s share;
∴ *B* gets $\frac{1}{8}$ of £640, or, £80;
A gets 3 × £80, or, £240;
C gets 4 × £80, or, £320.

(7) The 1st boy gets 7 when the 2nd gets 8;
the 3rd boy gets 10 when the 2nd gets 8;
now 7 + 8 + 10 = 25;
∴ first boy gets $\frac{7}{25}$ of 100, or, 28;
2nd boy gets $\frac{8}{25}$ of 100, or, 32;
3rd boy gets $\frac{10}{25}$ of 100, or, 40.

(8) 5450*s.* + 7085*s.* + 9810*s.* = 22345*s.*;
∴ *A* gets $\frac{5450}{22345}$ of £418. 19*s.* 4½*d.*, or, £102. 3*s.* 9*d.*;
B gets $\frac{7085}{22345}$ of £418. 19*s.* 4½*d.*, or, £132. 16*s.* 10½*d.*;
C gets $\frac{9810}{22345}$ of £418. 19*s.* 4½*d.*, or, £183. 18*s.* 9*d.*

(9) 4150 + 12450 + 24900 + 29050 = 70550;
∴ 1st town has $\frac{4150}{70550}$ of 1921, or, $\frac{1}{17}$ of 1921, or, 113
2nd town has $\frac{12450}{70550}$ of 1921, or, $\frac{3}{17}$ of 1921, or, 339;
3rd town has $\frac{24900}{70550}$ of 1921, or, $\frac{6}{17}$ of 1921, or, 678;
4th town has $\frac{29050}{70550}$ of 1921, or, $\frac{7}{17}$ of 1921, or, 791.

(10) 10*s.* + 5*s.* + 2*s.* 6*d.* + 1*s.* + 6*d.* + 4*d.* = 19*s.* 4*d.*
= 232*d.*;
∴ number of each = $\frac{29 \times 20 \times 12}{232}$ = 30.

(11) 500 + 350 + 800 + 90 = 1740;
∴ 1st person has $\frac{500}{1740}$ of 200 ac., or, $57\frac{41}{87}$ ac.;
2nd person has $\frac{350}{1740}$ of 200 ac., or, $40\frac{20}{87}$ ac.;
3rd person has $\frac{800}{1740}$ of 200 ac., or, $91\frac{83}{87}$ ac.;
4th person has $\frac{90}{1740}$ of 200 ac., or, $10\frac{30}{87}$ ac.

(12) When *B* gets 1*s.* *A* gets 9*d.*;
when *B* gets 1*s.* *C* gets 2*s.*;
then 9*d.* + 12*d.* + 24*d.* = 45*d.*;
∴ *A* gets $\frac{9}{45}$ of 55*s.*, or, 11*s.*;
B gets $\frac{12}{45}$ of 55*s.*, or, 14*s.* 8*d.*;
C gets $\frac{24}{45}$ of 55*s.*, or, 29*s.* 4*d.*

(13) The pay of 7 women = the pay of 3 men;
the pay of 14 boys = the pay of $\frac{28}{5}$ women = the pay of $\frac{12}{5}$ men;
then $5 + 3 + \frac{12}{5} = \frac{52}{5}$;
∴ a man receives 52*s.* ÷ $\frac{52}{5}$, or, 5*s.*;
∴ 5 men will get 25*s.*;
7 women will get 15*s.*;
14 boys will get 12*s.*

(14) There are 9 women, 6 men, 15 children;
share of 9 women = share of 6 men;
share of 15 children = share of 5 men;
∴ (6 + 6 + 5) men get £129. 8*s*. 3*d*.;
∴ 6 men get $\frac{6}{17}$ of £129. 8*s*. 3*d*., or, £45. 13*s*. 6*d*.;
9 women get £45. 13*s*. 6*d*.;
15 children get $\frac{5}{6}$ of £45. 13*s*. 6*d*., or, £38. 1*s*. 3*d*.

Ex. (cxx), p. 216.

(1) On each pound of the cheaper, sold at 2*s*., he gains 6*d*.;
on each pound of the better, sold at 2*s*., he loses 3*d*.;
∴ he must put 1 lb. of the cheaper to 2 lb. of the better.

(2) On each barrel of the cheaper, sold at 30*s*., he gains 7*s*.;
on each barrel of the better, sold at 30*s*., he loses 8*s*.;
∴ he must put 8 barrels of the cheaper to 7 barrels of the better.

(3) On each pound of the cheaper, sold at 4*d*., he gains 4 farthings;
on each pound of the better, sold at 4*d*., he loses 3 farthings;
∴ he must put 3 lb. of the cheaper to 4 lb of the better.

(4) On each gallon of the cheaper, sold at 12*s*., he loses 4*s*.;
on each gallon of the better, sold at 12*s*., he loses 7*s*.;
on each gallon of water, sold at 12*s*., he gains 12*s*.
One way of making the mixture will be
12 gallons of the better,
7 gallons of water,
and (51 − 19), or, 32 gallons of the cheaper and water, mixed in the ratio 3 : 1, that is 24 gallons of cheaper and 8 gallons of water, so that he will have 15 gallons of water in all.

Ex. (cxxi), p. 217.

(1) Reckoning both days specified,
A is in the business 288 days;
B is in the business 168 days;
and their capitals are in the ratio 4 : 3;
∴ we must divide £943 in the ratio 1152 : 504;
∴ *A* gets $\frac{1152}{1656}$ of £943, or, £287;
B gets $\frac{504}{1656}$ of £943, or, £656.

(2) We have to divide £70 in the ratio 120 : 300;
∴ *D* gets $\frac{120}{420}$ of £70, or, £20;
E gets $\frac{300}{420}$ of £70, or, £50.

(3) 3500 + 4800 + 8100 = 16400;
∴ *A* gets $\frac{35}{164}$ of £410, or, £87. 10*s.*;
B gets $\frac{48}{164}$ of £410, or, £120;
C gets $\frac{81}{164}$ of £410, or, £202. 10*s.*

(4) 30 + 48 + 28 = 106;
∴ 1st pays $\frac{30}{106}$ of £26. 10*s.*, or, £7. 10*s.*;
2nd pays $\frac{48}{106}$ of £26. 10*s.*, or, £12;
3rd pays $\frac{28}{106}$ of £26. 10*s.*, or, £7.

(5) One works (9×6+8×6) hr., or, 102 hr. in the fortnight:
the other works ($9\frac{1}{2}$ × 10) hr., or, 95 hr. in the fortnight;
∴ 1st receives $\frac{102}{197}$ of £7. 7*s.* 9*d.*, or, £3. 16*s.* 6*d.*;
2nd receives $\frac{95}{197}$ of £7. 7*s.* 9*d.*, or, £3. 11*s.* 3*d.*

(6) 400 × 12 + 500 × 10 = 4800 + 5000 = 9800;
300 × 12 + 600 × 9 = 3600 + 5400 = 9000;
∴ *A* gets $\frac{98}{188}$ of £470, or, £245;
B gets $\frac{90}{188}$ of £470, or, £225.

Ex. (cxxii), p. 220.

(1) Months required $= \frac{250\times4+350\times10}{250+350} = \frac{4500}{600} = 7\frac{1}{2}$.

(2) Months required $= \frac{900+1600+3000}{300+400+500} = \frac{5500}{1200} = 4\frac{7}{12}$.

(3) Months required $= \frac{550\cdot5+1714+1662\cdot5}{275\cdot25+342\cdot8+237\cdot5} = \frac{3927}{855\cdot55}$
$= 4\cdot6$ nearly.

(4) Months required $= \frac{350\times3+420\times4+280\times6}{1050} = \frac{441}{105} = 4\frac{1}{5}$.

(5) He has to pay £140 at the end of 50 days;
he has to pay £120 at the end of 74 days;
he has to pay £380 at the end of 106 days;
∴ equated time $= \frac{7000+8880+40280}{140+120+380}$ days $= \frac{56180}{640}$ days
$= 88$ days nearly.
∴ he should pay the debts together on May 28.

(6) He has to pay 24418*d.* at the end of 26 days;
he has to pay 34594*d.* at the end of 51 days;
he has to pay 72946*d.* at the end of 64 days;
he has to pay 181688*d.* at the end of 120 days;
he has to pay 29258*d.* at the end of 135 days;
he has to pay 29258*d.* at the end of 143 days;
∴ equated time

$$= \frac{634868+1764294+4668544+21802560+3949830+4183894}{24418+34594+72946+181688+29258+29258}$$

$= \frac{37003990}{372162}$ days $= 99\cdot4$ days nearly.

Ex. (cxxiii), p. 222.

(1) 1 florin $= \frac{1}{12}$ of £1;
$= \frac{1}{12}$ of 25 fr. 56 cents $=$ 2 fr. 13 cents.

(2) 1 napoleon $=$ 20 francs;
$= \frac{20}{25\cdot5}$ of £1;
$= \frac{20\times2244}{25\cdot5}$ copeks $=$ 1760 copeks.

(3) 25·5 francs = 714 kr.;

∴ 1 franc = $\frac{7140}{255}$ kr.;

∴ a napoleon = $\frac{7140 \times 20}{255}$ kr. = 560 kr. = 9 fl. 20 kr.

(4) 23 nap. 12 fr. 50 cents = 472·5 fr.;

$= 472{\cdot}5 \times £\frac{1}{25{\cdot}2} = £\frac{75}{4} = £18.\ 15s.$

∴ he has left £4. 17*s.* 6*d.*

(5) $6\frac{2}{3}$ thalers = 25·6 fr.;

∴ 1 thaler = $\frac{25{\cdot}6 \times 3}{20}$ fr. = 3·84 fr. = 3 fr. 84 cents.

(6) If I take £1 in English money I shall get for it 700 kr.;

If I take £1 in its value in French money I get $\frac{25{\cdot}20 \times 500}{20}$ kr. or 630 kr.;

∴ I lose 70 kr.;

and since $\frac{700}{70} = 10$, I shall lose the tenth part of my outlay in English money, or 10 per cent.

(7) £5·5 = $\frac{5{\cdot}5 \times 20}{3}$ thalers;

= $\frac{55 \times 2 \times 93}{3 \times 25}$ fr.;

= $\frac{55 \times 2 \times 93 \times 5}{3 \times 25 \times 27}$ scudi;

= $\frac{55 \times 2 \times 93 \times 5 \times 135}{3 \times 25 \times 27 \times 62}$ gulden = 55 gulden.

(8) 270 naps. = (270 × 16)*s.*

= $\frac{270 \times 16 \times 12}{54}$ milrees = 960 milrees.

(9) For £1 he gets 25 francs;

for £1 he gets $\frac{25 \times 135}{300}$ gulden, or, $\frac{135}{12}$ gulden;

for £1 he gets $\frac{135 \times 20\frac{1}{2}}{12}d.$, or, $230\frac{5}{8}d.$;

∴ he loses $(240 - 230\frac{5}{8})d.$, or, $9\frac{3}{8}d.$ in £1.

(10) £50 = (50 × 25·7) francs;

= $\frac{50 \times 25{\cdot}7 \times 40{\cdot}5}{100}$ florins = 520·425 florins.

Ex. (cxxiv), p. 227.

(1) (7×5) sq. ft. $= 35$ sq. ft.

(2) $(13\frac{1}{2} \times 10)$ sq. ft. $= 135$ sq. ft.

(3) $(22\frac{1}{4} \times 13\frac{1}{2})$ sq. ft. $= \frac{2403}{8}$ sq. ft. $= 300\frac{3}{8}$ sq. ft.

(4) $(5\frac{1}{3} \times 2\frac{1}{4})$ sq. ft. $= \frac{16 \times 9}{3 \times 4}$ sq. ft. $= 12$ sq. ft.

(5) $(17\frac{5}{12} \times 26)$ sq. ft. $= \frac{2717}{6}$ sq. ft. $= 452\frac{5}{6}$ sq. ft.

(6) (16×14) sq. ft. $= 224$ sq. ft.

(7) (38×16) sq. ft. $= 608$ sq. ft.

(8) $(20\frac{1}{4} \times 7\frac{5}{12})$ sq. ft. $= \frac{2403}{16}$ sq. ft. $= 150\frac{3}{16}$ sq. ft.

(9) $(23 \times 17\frac{1}{2})$ sq. ft. $= \frac{805}{2}$ sq. ft. $= 402\frac{1}{2}$ sq. ft.

(10) $(\frac{11}{2} \times \frac{11}{2})$ sq. yd. $= \frac{121}{4}$ sq. yd. $= 30\frac{1}{4}$ sq. yd.

(11) $(\frac{149}{4} \times \frac{149}{4})$ sq. yd. $= \frac{22201}{16}$ sq. yd. $= 1387\frac{9}{16}$ sq. yd.

(12) $(\frac{71}{4} \times \frac{71}{4})$ sq. ft. $= \frac{5041}{16}$ sq. ft. $= 315\frac{1}{16}$ sq. ft.

(13) $(\frac{59}{2} \times \frac{59}{2})$ sq. ft. $= \frac{3481}{4}$ sq. ft. $= 870\frac{1}{4}$ sq. ft.

(14) $(\frac{115}{12} \times \frac{115}{12})$ sq. ft. $= \frac{13225}{144}$ sq. ft. $= 91$ sq. ft. 121 sq. in.

(15) $(\frac{10}{3} \times \frac{10}{3})$ sq. ft. $= \frac{100}{9}$ sq. ft. $= 11\frac{1}{9}$ sq. ft.

(16) $(22\frac{5}{12} \times 22\frac{5}{12})$ sq. ft. $= \frac{72361}{144}$ sq. ft. $= 502$ sq. ft. 73 sq. in.

(17) $(47\frac{1}{4} \times 47\frac{1}{4})$ sq. ft. $= \frac{35721}{16}$ sq. ft. $= 2232$ sq. ft. 81 sq. in.

(18) Breadth $= \frac{176}{11}$ ft. $= 16$ ft.

(19) Breadth $= \frac{10324}{116}$ in. $= 89$ in. $= 7$ ft. 5 in.

(20) Breadth $= \frac{123060}{1172}$ in. $= 105$ in. $= 8$ ft. 9 in.

(21) Breadth $= \frac{4840}{440}$ yd. $= 11$ yd.

(22) Breadth $= \frac{5 \times 4840}{275}$ yd. $= 88$ yd.

(23) Breadth $= \dfrac{876 \times 30\frac{1}{4} \times 9}{803}$ ft. $= \frac{219 \times 121 \times 9}{803}$ ft. $= 99$ yd.

(24) Side $= \sqrt{81}$ ft. $= 9$ ft.

(8) Area of sides $= \{ (52 + 42) \times 10 \}$ sq. ft. $= 940$ sq. ft.;
deductions $= \{ (5\frac{1}{4} \times 4) + (7 \times 4\frac{1}{2}) + (2 \times 6 \times 3\frac{1}{2}) \}$ sq. ft.
$= 94\frac{1}{2}$ sq. ft.;
length of paper $= \frac{940 - 94\frac{1}{2}}{1\frac{2}{3}}$ ft. $= \frac{1691 \times 3}{5 \times 2}$ ft. $= \frac{1691}{10}$ yd.;
cost of paper $= (169 \cdot 1 \times 9)d. = 1521 \cdot 9d. =$ £6. 6s. $9\frac{9}{10}d.$

Ex. (cxxvii), p. 231.

(1) Area of floor $= (14\frac{1}{3} \times 15\frac{1}{2})$ sq. ft. $= \frac{43 \times 31}{6 \times 9}$ sq. yd.;
cost $= \frac{43 \times 31 \times 6}{6 \times 9}d. = \frac{1333}{9}d. =$ 12s. $4\frac{1}{9}d.$

(2) Area $= (146\frac{3}{4} \times 88\frac{3}{4})$ sq. ft. $= \frac{587 \times 355}{4 \times 4 \times 9}$ sq. yd.;
cost $= \frac{587 \times 355 \times 45}{4 \times 4 \times 9 \times 4}d. = \frac{1041925}{64}d. =$ £67. 16s. $8\frac{5}{64}d.$

(3) Area $= 44100$ sq. ft.;
$\therefore$ side $= \sqrt{44100}$ ft. $= 210$ ft.

(4) Area $= 18225$ sq. ft.;
$\therefore$ side $= \sqrt{18225}$ ft. $= 135$ ft.

(5) Area $= (40 \times 3 \times 100)$ sq. ft.;
number of turfs $= \frac{40 \times 3 \times 100}{3 \times 1} = 4000$;
cost $= \frac{4000 \times 6s.\ 9d.}{100} =$ £13. 10s.

(6) Area of ceiling $= 32\frac{1}{9}$ sq. yd.;
side of floor $= \sqrt{289}$ ft. $= 17$ ft.;
area of walls $= (4 \times 17 \times 11\frac{1}{2})$ sq. ft. $= 782$ sq. ft.;
$\therefore$ area to be whitewashed $= (32\frac{1}{9} + \frac{782}{9})$ sq. yd. $= 119$ sq. yd.;
$\therefore$ cost $= 119 \times \frac{5}{2}d. =$ £1. 4s. $9\frac{1}{2}d.$

(7) Area $= (8\frac{1}{4} \times 6\frac{2}{3})$ sq. yd. $= 55$ sq. yd.;
length of carpet $= (55 \div \frac{2}{3})$ yd. $= \frac{165}{2}$ yd.;
cost per yard $= (5445 \div \frac{165}{2})d. = 66d. =$ 5s. 6d.

(8) Area of paper $= (\frac{716}{4} \times \frac{2}{3})$ sq. yd. $= \frac{358}{3}$ sq. yd.;
height of room $= \{ \frac{358}{3} \div (16\frac{1}{2} + 13\frac{1}{3}) \}$ yd. $= \frac{358 \times 6}{3 \times 179}$ yd.
$= 12$ ft.

(7) Length $= \frac{22 \times 15\frac{1}{2}}{2\frac{1}{4}}$ ft. $= \frac{22 \times 31 \times 2}{9}$ ft. $= \frac{22 \times 31 \times 2}{27}$ yd.;

∴ cost $= \frac{22 \times 62 \times 54}{27}$*d.* = £11. 7*s.* 4*d.*

(8) Length $= \frac{29\frac{3}{4} \times 23\frac{1}{2}}{9}$ yd. $= \frac{119 \times 47}{8 \times 9}$ yd.;

∴ cost $= \frac{119 \times 47 \times 69}{8 \times 9}$*d.* $= \frac{128639}{24}$*d.* = £22. 6*s.* $7\frac{23}{24}$*d.*

(9) Length $= \frac{34\frac{2}{3} \times 13\frac{1}{4}}{9 \times \frac{3}{4}}$ yd. $= \frac{104 \times 53}{3 \times 27}$ yd.;

∴ cost $= \frac{104 \times 53 \times 81}{3 \times 27}$ halfpence = £11. 9*s.* 8*d.*

Ex. (cxxvi), p. 231.

(1) { (38 + 32) × 9 } sq. ft. = (70 × 9) sq. ft. = 630 sq. ft.

(2) { $(49 + 36\frac{1}{2}) \times 10$ } sq. ft. = $(85\frac{1}{2} \times 10)$ sq. ft. = 855 sq. ft.

(3) { $(51\frac{1}{6} + 38\frac{2}{3}) \times 9\frac{3}{4}$ } sq. ft. = $(89\frac{5}{6} \times 9\frac{3}{4})$ sq. ft. = $875\frac{7}{8}$ sq. ft.

(4) { $(46\frac{5}{6} + 37\frac{1}{6}) \times 9\frac{1}{2}$ } sq. ft. = $(84 \times 9\frac{1}{2})$ sq. ft. = 798 sq. ft.

(5) Area of paper = { (36 + 28) × 8 } sq. ft. = (64 × 8) sq. ft.;
length of paper $= \frac{64 \times 8}{1\frac{1}{3}}$ ft. = 128 yd.;
cost of paper = 128*s.* = £6. 8*s.*

(6) Area of paper = { $(41 + 34\frac{2}{3}) \times 9$ } sq. ft. = 681 sq. ft.;
length of paper $= \frac{681}{1\frac{2}{3}}$ ft. $= \frac{681 \times 3}{5}$ ft. $= \frac{681}{5}$ yd.
cost of paper $= \frac{681 \times 3}{5}$ ft. × 5*d.* = 681*d.* = £2. 16*s.* 9*d.*

(7) Area of paper = { $(61\frac{1}{3} + 52\frac{5}{6}) \times 10\frac{1}{2}$ } sq. ft. $= \frac{4795}{4}$ sq. ft.;
length of paper $= \frac{4795}{8}$ ft. $= \frac{4795}{8 \times 3}$ yd.;
cost of paper $= \frac{4795 \times 8}{8 \times 3}$*d.* = £6. 13*s.* $2\frac{1}{3}$*d.*

(17) Area of field = 245388 sq. yd.;
length of other side = $\frac{245388}{572}$ yd. = 429 yd.;
diagonal = $\sqrt{\{(572)^2 + (429)^2\}}$ yd. = $\sqrt{511225}$ yd.
= 715 yd.

(18) Area of each part = (440 × 215) sq. ft. = 94600 sq. ft.
= $10511\frac{1}{9}$ sq. yd.;
area covered by trees = {(900 × 20) + (430 × 20)} sq. ft.
= 26600 sq. ft. = $2955\frac{5}{9}$ sq. yd.

(19) Writing *length* for *measure of length in feet*, and *breadth* for *measure of breadth in feet.*
Area of walls = { (twice length + twice breadth) × 11 } sq. ft.;
area of walls = { (four times breadth + twice breadth) × 11 } sq. ft.;
area of walls = (66 times breadth) sq. ft.;
∴ 66 times breadth = 143 × 6;
∴ breadth = 13 ft., and ∴ length = 26 ft.;
∴ length of moulding = $\frac{13+13+26+26}{3}$ yd. = 26 yd.

(20) Area of walls = $\{(54\frac{2}{3} + 40) \times 12\frac{1}{2}\}$ sq. ft. = $\frac{3550}{3}$ sq. ft.;
area of ceiling = $(27\frac{1}{3} \times 20)$ sq. ft. = $\frac{1640}{3}$ sq. ft.;
∴ area to be painted = $\frac{5190}{3}$ sq. ft.;
∴ cost = $\frac{5190 \times 17}{9 \times 3 \times 2}$*d.* = $\frac{14705}{9}$*d.* = £6. 16*s.* $1\frac{8}{9}$*d.*

(21) Area of carpet = $(15\frac{3}{4} \times 13\frac{1}{3})$ sq. ft. = $\frac{63 \times 40}{4 \times 3}$ sq. ft.;
length of carpet = $\frac{63 \times 40 \times 12}{4 \times 3 \times 27}$ ft. = $\frac{7 \times 40}{3}$ ft. = $\frac{7 \times 40}{9}$ yd.;
cost of carpet = $\frac{7 \times 40 \times 9}{9 \times 2}$*s.* = £7.

(22) Area of carpet = $(10\frac{2}{3} \times 7\frac{1}{3})$ sq. yd. = $\frac{32 \times 22}{9}$ sq. yd.;
length of carpet = $\frac{32 \times 22 \times 4}{9 \times 3}$ yd.;
cost of carpet = $\frac{32 \times 22 \times 4 \times 9}{9 \times 3 \times 2}$*s.* = £23. 9*s.* 4*d.*

(23) Area of carpet = (11×8) sq. yd.;
length of carpet = $\frac{396}{3}$ yd. = 132 yd.;
∴ width of carpet = $\frac{11 \times 8}{132}$ yd. = $\frac{2}{3}$ yd. = 2 feet.

(24) Width of cloister = 4·15 yd.;
length to be paved = $(45{\cdot}77 + 8{\cdot}3 + 45{\cdot}77 + 8{\cdot}3 + 41{\cdot}93 + 41{\cdot}93)$ yd.;
area to be paved = $(192 \times 4{\cdot}15)$ sq. yd.;
number of stones = $\frac{192 \times 4{\cdot}15 \times 9}{5{\cdot}76 \times 4{\cdot}15} = \frac{192}{{\cdot}64} = 300$.

Ex. (cxxviii), p. 235.

(1) Content = $(8 \times 7 \times 6)$ c. ft. = 336 c. ft.

(2) Content = $(\frac{21}{2} \times \frac{33}{4} \times \frac{19}{3})$ c. ft. = $548\frac{5}{8}$ c. ft.

(3) Content = $(\frac{11}{2} \times \frac{17}{4} \times \frac{43}{12})$ c. ft. = $83\frac{73}{96}$ c. ft.

(4) Content = $(\frac{35}{3} \times \frac{59}{6} \times \frac{89}{12})$ c. ft. = $850\frac{185}{216}$ c. ft.

(5) Content = $(\frac{61}{3} \times \frac{127}{12} \times \frac{59}{12})$ c. ft. = $1058\frac{17}{432}$ c. ft.

(6) Content of wall = $(75 \times 12 \times 6 \times 12 \times 18)$ c. in.;
content of a brick = $(9 \times \frac{9}{2} \times 3)$ c. in.;
∴ number of bricks = $\frac{75 \times 12 \times 6 \times 12 \times 18 \times 2}{9 \times 9 \times 3} = 9600$.

(7) Cubic content of ice = $(45 \times 4840 \times 9 \times 144 \times 3)$ c. in.;
weight of ice = $\frac{45 \times 4840 \times 9 \times 144 \times 3 \times 920}{1728}$ oz.;
$= \frac{45 \times 4840 \times 9 \times 144 \times 3 \times 920}{1728 \times 16 \times 112 \times 20}$ tons;
$= \frac{45 \times 605 \times 9 \times 23}{16 \times 28}$ tons = $12579\frac{183}{448}$ tons.

(8) In 1 month $(800 \times 500 \times 40)$ c. yd. are dug by (4×500) men;
in 1 month 1 c. yd. is dug by $\frac{500 \times 4}{800 \times 500 \times 40}$ man;
in 5 months 1 c. yd. is dug by $\frac{1}{800 \times 10 \times 5}$ man;
in 5 months $(1000 \times 400 \times 50)$ c. yd. are dug by
$\frac{1000 \times 400 \times 50}{800 \times 10 \times 5}$ men, or, 500 men.

(9) Area of side $= \frac{8664}{24}$ sq. in. $= 361$ sq. in.;
∴ length of edge $= \sqrt{361}$ in. $= 19$ in. $= 1$ ft. 7 in.

(10) Content of cistern $= (4 \times 2\frac{1}{2} \times 3\frac{1}{4})$ c. ft. $= \frac{5 \times 13}{2}$ c. ft.;
weight of water $= (5 \times 13 \times 500)$ oz. $= 2031\frac{1}{4}$ lb.

(11) Content of stone $= (4 \times \frac{5}{2} \times \frac{5}{4})$ c. ft. $= \frac{25}{2}$ c. ft.;
∴ 1 c. ft. of the stone weighs $\frac{27 \times 2}{25}$ cwt.;
1 c. in. of the stone weighs $\frac{27 \times 2}{25 \times 1728}$ cwt.;
100 c. in. of the stone weigh $\frac{27 \times 2 \times 100}{25 \times 1728} = \frac{1}{8}$ cwt. $=$ 14 lb.

(12) Contents of vessel weigh 166375 oz.;
∴ content of vessel $= \frac{166375}{1000}$ c. ft.;
∴ side of vessel $= \sqrt[3]{(166\cdot375)}$ ft. $= 5\cdot5$ ft.

(13) In 42 days $(3 \times 440 \times 30 \times 7)$ c. yd. are dug by 120 men;
in 1 day 1 yd. is dug by $\frac{120 \times 42}{3 \times 440 \times 30 \times 7}$ men;
in 30 days $(1000 \times 36 \times \frac{22}{3})$ c. yd. are dug by
$\frac{120 \times 42 \times 1000 \times 12 \times 22}{3 \times 440 \times 30 \times 7 \times 3}$ men, that is by 160 men.

(14) 2520 lb. of liquid have for cubic content $(9 \times \frac{16}{3} \times \frac{9}{4})$ c. ft.;
1 lb. of liquid has for cubic content $\frac{9 \times 16 \times 9}{2520 \times 3 \times 4}$ c. ft.;
3850 lb. of liquid have for cubic content $\frac{9 \times 16 \times 9 \times 3850}{2520 \times 3 \times 4}$ c. ft.
$= 165$ c. ft.;
∴ depth of cistern $= \frac{165}{8 \times 5\cdot5}$ ft. $= \frac{30}{8}$ ft. $= 3\frac{3}{4}$ ft.

(15) Cost of excavation $= (110 \times 6 \times \frac{1}{3})$*s.* $= 220$*s.*;
cost of rubble $= (110 \times 6 \times \frac{2}{9})$*s.* $= 146$*s.* 8*d.*;
cost of gravel $= (110 \times 6 \times \frac{1}{4}) \times \frac{5}{2}$*s.* $= 412$*s.* 6*d.*;
∴ whole cost $= 779$*s.* 2*d.* $=$ £38. 19*s.* 2*d.*

EXAMINATION PAPERS.

Page 236.

(1) Twenty millions, one hundred and three thousand and seven; 19001006.

(2) 220015. (3) 42704 − 37859 = 4845.

(4)
$$\begin{array}{r} 7256\\ 892\\ \hline 14512\\ 65304\\ 58048\\ \hline 6472352 \end{array} \qquad\qquad \begin{array}{r} 49382\\ 375\\ \hline 246910\\ 345674\\ 148146\\ \hline 18518250 \end{array}$$

(5)
$$\begin{array}{l} 532\,)\,173432\,(\,326\\ 1596\\ \overline{1383}\\ 1064\\ \overline{3192}\\ 3192\\ \overline{} \end{array} \qquad\qquad \begin{array}{l} 340\,)\,2667640\,(\,7846\\ 2380\\ \overline{2876}\\ 2720\\ \overline{1564}\\ 1360\\ \overline{2040}\\ 2040\\ \overline{} \end{array}$$

(6) 225003010; nine hundred and ninety-nine millions, nine hundred and ninety thousand and ninety.

(7) 8000008 − 70077 = 7929931.

(8)
$$\begin{array}{r} 8649 \\ \underline{4237} \\ 60543 \\ 25947 \\ 17298 \\ \underline{34596} \\ 36645813 \end{array} \qquad \begin{array}{r} 7650 \\ \underline{389} \\ 68850 \\ 61200 \\ \underline{22950} \\ 2975850 \end{array}$$

(9)
$$\begin{array}{l} 598)\,50222122\,(83983 \\ \underline{4784} \\ \underline{\begin{array}{r}2382\\1794\end{array}} \\ \underline{\begin{array}{r}5881\\5382\end{array}} \\ \underline{\begin{array}{r}4992\\4784\end{array}} \\ \underline{\begin{array}{r}2082\\1794\end{array}} \\ 288 \end{array} \qquad \begin{array}{l} 40072)\,38871923744\,(970052 \\ \underline{360648} \\ \underline{\begin{array}{r}280712\\280504\end{array}} \\ \underline{\begin{array}{r}208374\\200360\end{array}} \\ \underline{\begin{array}{r}80144\\80144\end{array}} \end{array}$$

(10) 58 − 23 = 35.

(11) 1250000 − 700921 = 549079.

(12)
$$\begin{array}{r|l} 9 & 436694 \\ \hline 6 & 48521 \text{ and 5 units over.} \\ \hline & 8086 \text{ and 5 parcels of 9 units over.} \end{array}$$

∴ remainder is 5 + 45, or, 50.

(18) 5947) 5985 (1
5947
38) 5947 (156
38
214
190
247
228
19) 38 (2
38

∴ H. C. F. is 19.

(14) 869875
78946
5219250
3479500
7828875
6959000
6089125
68673151750

(15) 423) 39342154 (93007
3807
1272
1269
3154
2961
193

(16) 3500015
315005
59095
3874115
410382
3463733

9008010
8597628
410382

(17) 59 + 47 = 106.

(18) 1485) 4941 (3
4455
486) 1485 (3
1458
27) 486 (18
27
216
216

∴ 27 is H. C. F.

504) 5292 (1
504
252) 504 (2
504

252) 1520 (6
1512
8) 252 (31
24
12
8
4) 8 (2
8

∴ 4 is H. C. F.

(19) 4 | 48602728
12 | 12150682
2,0 | 1012556 . 10*d.*
£50627. 16*s.* 10*d.*

(20) £ . s. . d.
19) 825 . 1 . $10\frac{3}{4}$ (£43
76
65
57
8
20
161 (8*s.*
152
9
12
118 (6*d.*
114
4
4
19 (1*q.*
19

(21) 2214) 2600509050 (1174575
2214
3865
2214
16510
15498
10129
8856
12730
11070
16605
15498
11070
11070

(23) 19527) 23667 (1
19527
4140) 19527 (4
16560
2967) 4140 (1
2967
1173) 2967 (2
2346
621) 1173 (1
621
552) 621 (1
552
69) 552 (8
552

∴ 69 is H. C. F.

(22) £ . s. . d.
123 . 17 . $11\frac{1}{4}$
20
2477
12
29735
4
118941

(24)

$$\begin{array}{r|r}
 & 42,\ 56,\ 126,\ 154 \\ \hline
7 & 56,\ 126,\ 154 \\ \hline
2 & 8,\ 18,\ 22 \\ \hline
 & 4,\ 9,\ 11
\end{array}$$

∴ L. C. M. $= 14 \times 36 \times 11 = 5544$.

(25) Smaller number + (smaller number + 16) = 148.
∴ twice the smaller number = 132.
∴ the smaller is 66 and the greater 82.

(26) $\frac{185}{333} = \frac{5 \times 37}{9 \times 37} = \frac{5}{9}$

$\frac{2772}{8064} = \frac{693}{2016} = \frac{77}{224} = \frac{11}{32}$

(27)

$$\begin{array}{r}
87 \\
56 \\ \hline
522 \\
435 \\ \hline
4872 \\
409 \\ \hline
43848 \\
19488 \\ \hline
1992648
\end{array}$$

(28)

$$\begin{array}{rcrcr}
£ & & s. & & d. \\
27 & . & 14 & . & 7\frac{1}{2} \\
 & & & & 11 \\ \hline
305 & . & 0 & . & 10\frac{1}{2} \\
 & & & & 7 \\ \hline
£2135 & . & 6 & . & 1\frac{1}{2}
\end{array}$$

(29)

$$\begin{array}{r|r}
 & 9,\ 12,\ 18,\ 30,\ 48,\ 60 \\ \hline
6 & 18,\quad 48,\ 60 \\ \hline
2 & 3,\quad 8,\ 10 \\ \hline
 & 3,\quad 4,\ 5
\end{array}$$

∴ L. C. M. $= 12 \times 60 = 720$.

(30)

$$\begin{array}{r|l}
12 & 900000000 \\ \hline
2{,}0 & 7500000{,}0 \\ \hline
 & £3750000
\end{array}$$

(31)

$$\begin{array}{r}
70700007 \\
1200678 \\ \hline
71900685 \\
90000 \\ \hline
71810685
\end{array}$$

(32)

$$\begin{array}{r}
43 \\
35 \\ \hline
215 \\
129 \\ \hline
1505
\end{array}$$

(33) 11431) 12006 (1
11431
575) 11431 (19
575
5681
5175
506) 575 (1
506
69) 506 (7
483
23) 69 (3
69

∴ 23 is H. C. F.

(34)
| 1, 2, 3, 4, 5, 6, 7, 8, 9
2 | 5, 6, 7, 8, 9
3 | 5, 3, 7, 4, 9
| 5, 1, 7, 4, 3

∴ L. C. M. = 6 × 35 × 12 = 2520.

(35)
£ . s. . d.
14789 . 19 . $11\frac{3}{4}$
20
295799
12
3549599
4
14198399

(36) $\frac{54792}{89154} = \frac{6088}{9906} = \frac{3044}{4953}$

$\frac{4}{51} \times \frac{3}{64} \times \frac{340}{25} = \frac{4\times3\times17\times20}{3\times17\times64\times25} = \frac{20}{16\times25} = \frac{1}{20}.$

(37)
563000401
36800
450400320800
3378002406
1689001203
20718414756800

79000000) 20718414756800 (262258
158000000
491841475
474000000
178414756
158000000
204147568
158000000
461475680
395000000
664756800
632000000
32756800

(38)
$$\begin{array}{r}
\text{£} \quad s. \quad d. \\
2 \,.\, 13 \,.\, 4 \\
3 \\ \hline
8 \,.\, 0 \,.\, 0 \\
5 \\ \hline
\text{£}40 \,.\, 0 \,.\, 0
\end{array}$$

(39)
$$\begin{array}{r|r}
 & \text{£} \quad s. \quad d. \\
4 & 17 \,.\, 13 \,.\, 4 \\ \hline
5 & 4 \,.\, 8 \,.\, 4 \\ \hline
 & 17 \,.\, 8
\end{array}$$

(41)
$$\begin{array}{r|l}
 & d. \\
 & 365 \\
 & \quad 8\tfrac{1}{2} \\ \hline
 & 2920 \\
 & \ 182\tfrac{1}{2} \\ \hline
12 & 3102\tfrac{1}{2} \\ \hline
2{,}0 & \ \ 25{,}8 \ \ 6\tfrac{1}{2}d. \\ \hline
 & \text{£}12.\ 18s.\ 6\tfrac{1}{2}d.
\end{array}$$

(40)
$$\begin{array}{r|l}
5 & 436694 \\ \hline
7 & 87338 \text{ and 4 units over.} \\ \hline
 & 12476 \text{ and 30 units over.}
\end{array}$$

(42) $\frac{1}{2} + \frac{3}{4} + \frac{7}{8} = \frac{4+6+7}{8} = \frac{17}{8} = 2\frac{1}{8}$.

(43) $\text{£}2.\ 10s. + 12s.\ 6d. + 5s. + 5d. = \text{£}3.\ 7s.\ 11d. = 3260q$

(44) $\dfrac{\text{£}275.\ 15s.\ 1\frac{1}{2}d.}{18} = \dfrac{\text{£}91.\ 18s.\ 4\frac{1}{2}d.}{6} = \text{£}15.\ 6s.\ 4\frac{3}{4}d.$

(45) $12000 + 1200 + 12 = 13212$

$$\begin{array}{r}
13212 \\
1777 \\ \hline
92484 \\
92484 \\
92484 \\
13212 \\ \hline
23477724
\end{array}$$

Twenty-three millions, four hundred and seventy-seven thousand, seven hundred and twenty-four.

(46) $40200 - 37601 = 2599$;
$2599 \div 23 = 113$.

(47) $\frac{12}{13}$ of $\frac{84175}{99900} = \frac{6475}{8325} = \frac{1295}{1665} = \frac{7}{9}$.

(48) $\frac{1}{5} + 13\frac{3}{10} + \frac{24}{35} = 13 + \frac{14+21+188}{70} = 16\frac{13}{70}$.

(49)

$$\begin{array}{rcrcr} £ & & s. & & d. \\ 961 & . & 4 & . & 5\frac{3}{4} \\ & & & & 5 \\ \hline 4806 & . & 2 & . & 4\frac{3}{4} \\ & & & & 7 \\ \hline £33642 & . & 16 & . & 9\frac{1}{4} \end{array}$$

$$\begin{array}{r|rcrcr} & £ & & s. & & d. \\ 5 & 961 & . & 4 & . & 5\frac{3}{4} \\ \hline 7 & 192 & . & 4 & . & 10\frac{3}{4} \\ \hline & £27 & . & 9 & . & 3\frac{1}{4} \end{array}$$

(50)

$$\begin{array}{r|ll} & \text{oz.} & \\ 4 & 8795342 & \\ \hline 4 & 2198835\ .\ 2 & \multirow{2}{*}{\Big\}\ 14\text{ oz.}} \\ \hline 4 & 549708\ .\ 12 & \\ \hline 7 & 137427 & \\ \hline 4 & 19632\ .\ 12\text{ lb.} & \\ \hline 2{,}0 & 490{,}8 & \\ \hline & 245\text{ tons }8\text{ cwt.} & \end{array}$$

(51)

$6 \times 20 \times 42 \times 72 = 362880$

$$\begin{array}{r|r} 3 & 362880 \\ \hline 5 & 120960 \\ \hline 7 & 24192 \\ \hline & 3456 \end{array}$$

(52) He gains 6*d.* on each yard;

∴ his profit was 500 × 6*d.* = £12. 10*s.*

(53)

$$\begin{array}{l} 372\,)\,837\,(\,2 \\ \underline{744} \\ 93\,)\,372\,(\,4 \\ \underline{372} \end{array}$$

$$\begin{array}{l} 93\,)\,248\,(\,2 \\ \underline{186} \\ 62\,)\,93\,(\,1 \\ \underline{62} \\ 31\,)\,62\,(\,2 \\ \underline{62} \end{array}$$

∴ H. C. F. is 31.

$$\frac{7}{9} = \frac{7 \times 13 \times 29}{9 \times 13 \times 29} = \frac{2639}{9 \times 13 \times 29};$$

$$\frac{11}{13} = \frac{11 \times 9 \times 29}{9 \times 13 \times 29} = \frac{2871}{9 \times 13 \times 29};$$

$$\frac{24}{29} = \frac{24 \times 9 \times 13}{9 \times 13 \times 29} = \frac{2808}{9 \times 13 \times 29};$$

∴ the decreasing order is

$\frac{11}{13}, \frac{24}{29}, \frac{7}{9}.$

(54)

$$\begin{array}{r} 21{\cdot}945 \\ 5{\cdot}08 \\ \hline 175560 \\ 109725 \\ \hline \end{array}$$

$$\begin{array}{l} {\cdot}381\,)\,111{\cdot}48060\,(\,292{\cdot}6 \\ \phantom{{\cdot}381\,)\,}\underline{762} \\ \phantom{{\cdot}381\,)\,}3528 \\ \phantom{{\cdot}381\,)\,}\underline{3429} \\ \phantom{{\cdot}381\,)\,3}990 \\ \phantom{{\cdot}381\,)\,3}\underline{762} \\ \phantom{{\cdot}381\,)\,}2286 \\ \phantom{{\cdot}381\,)\,}\underline{2286} \end{array}$$

(55) $\dfrac{\pounds 9.\ 17s.\ 8\frac{1}{2}d.}{365} = \dfrac{\pounds 1.\ 19s.\ 6\frac{1}{2}d.}{73} = 6\frac{1}{2}d.$

(56) 7 cwt. 3 qr. 24 lb.
4
31 qr.
28
272
62
892 lb.
16
14272 oz.

	oz.
4	7805491
4	1951372 . 3 oz.
4	487843
7	121960 . 3 } 27 lb.
4	17422 . 24 } 27 lb.
2,0	435,5 . 2 qr.
	217 tons 15 cwt.

(57)

£	s.	d.	
35	17	$4\frac{1}{2}$	
		10	
358	13	9	for 10
		10	
3586	17	6	for 100
		3	
10760	12	6	for 300
358	13	9	for 10
179	6	$10\frac{1}{2}$	for 5
£11298	13	$1\frac{1}{2}$	for 315

(58) $7816 + 325\frac{2}{3} = \frac{7816\times 3}{977} = 24.$

(59) $6 + \frac{11}{12} + \frac{17}{16} + \frac{59}{60} + \frac{47}{48} + \frac{59}{60}$
$= 6 + 1 - \frac{1}{12} + 1 + \frac{1}{16} + 1 - \frac{1}{60} + 1 - \frac{1}{48} + 1 - \frac{1}{60}$
$= 11 - \frac{2}{48} - \frac{2}{60} = 11 - \frac{1}{24} - \frac{1}{30} = 10\frac{37}{40}.$

(60) 1·000
·979
·021

(61) 107020060; twenty-one millions six hundred and thirty-seven thousand, and thirty-seven.

(62)

$$\begin{array}{r|rcrcr} & \pounds & & s. & & d. \\ 7 & 23596 & . & 11 & . & 8\frac{1}{4} \\ \hline 9 & 3370 & . & 18 & . & 9\frac{3}{4} \\ \hline & \pounds 374 & . & 10 & . & 11\frac{3}{4} \end{array}$$

(63)

$$\begin{array}{r} 3{\cdot}073 \\ 3{\cdot}15 \\ \hline 15365 \\ 3073 \\ 9219 \\ \hline \end{array}$$

$$131{\cdot}7\,)\,9{\cdot}67995\,(\,{\cdot}0735$$

$$\begin{array}{r} 9219 \\ \hline 4609 \\ 3951 \\ \hline 6585 \\ 6585 \\ \hline \end{array}$$

(64) He spends $\frac{7}{365}$ of £561. 3*s*. 9*d*.
or $\frac{7 \times (\pounds 112.\ 4s.\ 9d.)}{73}$
or 7 × (£1. 10*s*. 9*d*.), or, £10. 15*s*. 3*d*.

(65) Length of pace in inches $= \frac{3\frac{3}{4} \times 1760 \times 36}{7920}$
$= \frac{15 \times 176 \times 4}{88 \times 4} = 30.$

(66)

$$\begin{array}{rcrcrl} \pounds & & s. & & d. & \\ 35 & . & 4 & . & 2 & \\ & & & & 10 & \\ \hline 352 & . & 1 & . & 8 & \text{for } 10 \\ & & & & 10 & \\ \hline 3520 & . & 16 & . & 8 & \text{for } 100 \\ & & & & 2 & \\ \hline 7041 & . & 13 & . & 4 & \text{for } 200 \\ 2112 & . & 10 & . & 0 & \text{for } 60 \\ 35 & . & 4 & . & 2 & \text{for } 1 \\ \hline \pounds 9189 & . & 7 & . & 6 & \text{for } 261 \end{array}$$

$$\begin{array}{rcrcr} \pounds & & s. & & d. \\ 9189 & . & 7 & . & 6 \\ 9089 & . & 5 & . & 0 \\ \hline \end{array}$$

$$89\,)\,100\ .\ 2\ .\ 6\,(\,\pounds 1$$

$$\begin{array}{l} 89 \\ \hline 11 \\ 20 \\ \hline 222\,(\,2s. \\ 178 \\ \hline 44 \\ 12 \\ \hline 534\,(\,6d. \\ 534 \\ \hline \end{array}$$

(67) $\dfrac{\text{1 ton 17 lb.}}{16} = \dfrac{\text{5 cwt. 4 lb. 4 oz.}}{4} = \text{1 cwt. 1 qr. 1 lb. 1 oz.}$

(68) $960 + 480 + 120 + 1 = 1561$, and $9366 \div 1561 = 6$.

(69) $\frac{1}{8} + \frac{29}{16} + (\frac{5}{16} - \frac{1}{4}) = \frac{31}{16} + \frac{1}{16} = \frac{32}{16} = 2.$

(70) $\frac{126000}{21} = 6000$; $\frac{\cdot 126}{210} = \cdot 0006.$

(71) $10000 \times 20 \times 4 \times 28$ lb. $= 22400000$ lb.

$$\begin{array}{r|l}
 & \text{lb.} \\
4 & 10000 \\
\hline
7 & 2500 \,.\, 4 \text{ lb.} \\
\hline
4 & 357 \,.\, 1 \text{ qr.} \\
\hline
2{,}0 & 8{,}9 \\
\hline
\end{array}$$

4 tons 9 cwt.

$$(72)\quad \begin{array}{rcrcr}
\text{ac.} & & \text{ro.} & & \text{po.} \\
275 & . & 3 & . & 21 \\
56 & . & 2 & . & 12 \\
187 & . & 1 & . & 0 \\
99 & . & 0 & . & 33 \\
 & & 2 & . & 20 \\
\hline
619 & . & 2 & . & 6
\end{array}$$

$$(73)\quad \begin{array}{rcrcll}
\pounds & & s. & & d. & \\
546 & . & 10 & . & 9\frac{1}{2} & \\
 & & & & 12 & \\
\hline
6558 & . & 9 & . & 6 & \text{for } 12. \\
 & & & & 12 & \\
\hline
78701 & . & 14 & . & 0 & \text{for } 144 \\
546 & . & 10 & . & 9\frac{1}{2} & \text{for } 1 \\
\hline
78155 & . & 3 & . & 2\frac{1}{2} & \text{for } 143
\end{array}$$

Since $71\frac{1}{2} = \frac{143}{2}$;

$(\pounds 546.\ 10s.\ 9\frac{1}{2}d.) \times \frac{143}{2}$;

$= \pounds 39077.\ 11s.\ 7\frac{1}{4}d.$

(74) He sells them for (48 × 10)*s.*, or, £24. ;
∴ he gains £(24 − 20), or, £4.

(75) $\frac{1}{15} + \frac{1}{35} + \frac{1}{24} + \frac{1}{48} + \frac{1}{63} = \frac{7+3}{105} + \frac{2+1}{48} + \frac{1}{63}$
$= \frac{2}{21} + \frac{1}{16} + \frac{1}{63} = \frac{7}{63} + \frac{1}{16} = \frac{1}{9} + \frac{1}{16} = \frac{25}{144}.$

	ac.	ro.	po.	yd.	ft.	in.
75)	1 .	1 .	1 .	1 .	1 .	1
						6
	7 .	2 .	6 .	6 .	6 .	6
						5
	37 .	2 .	31 .	$2\frac{1}{2}$.	3 .	30

77) $\frac{.14}{7} = \cdot02$

$\frac{14.0}{.007} = \frac{14000}{7} = 2000$

$\frac{.0014}{700} = \cdot000002$

∴ sum $= 2000\cdot020002 = \frac{2000020002}{1000000} = \frac{1000010001}{500000}$.

78) He spends $\frac{365}{7}$ of £10. 11s. 9d., or, 365 × {£1. 10s. 3d.}, or, £552. 1s. 3d.

79)
```
             ft.
   3   41707796
      ─────────────
  5½   13902598 . 2 ft.
   2,         2
  ──────────────────
  11   27805196
      ─────────────
  40    2527745 . 1 ft. 6 in.
      ─────────────
   8      63193 . 25 po.
      ─────────────
          7899 mi. 1 fur.
```

80)
```
     tons   cwt.   qr.   lb.
  9   54  .  19  .  3  .  27
     ──────────────────────────
  8    6  .   2  .  0  .  24 7/9
     ──────────────────────────
             15  .  1  .  3 7/72
```

81)
```
  228 ) 304 ( 1             76 ) 342 ( 4
        228                      304
        ───                      ───
         76 ) 228 ( 3             38 ) 76 ( 2
              228                      76
              ───                      ──
```

∴ 38 is the H. C. F.

```
  38 | 228, 304, 342
     ──────────────
   3 |   6,   8,   9
     ──────────────
   2 |   2,   8,   3
     ──────────────
         1,   4,   3
```

∴ L. C. M. = 38 × 72 = 2736.

(82) 320009009; ninety-nine thousand and two hundred-millionths.

(83) The train passes over 22 yards in a second;
∴ it runs at the rate of $\frac{22\times60\times60}{1760}$ mi., or, 45 miles an hour.

(84) $\frac{\cdot24}{\cdot012} = \frac{240}{12} = 20$
$\frac{240}{\cdot12} = \frac{24000}{12} = 2000$
$\frac{\cdot024}{120} = \cdot0002.$

(85) $\frac{5}{8} + \frac{42}{75} = \frac{375+336}{600} = 1\frac{37}{200}$
$\frac{5}{8} - \frac{42}{75} = \frac{375-336}{600} = \frac{13}{200}$
$\frac{5}{8} \times \frac{42}{75} = \frac{21}{4\times15} = \frac{7}{20}.$

(86)
```
78489 ) 648720 ( 8
        627912
        ------
         20808 ) 78489 ( 3
                 62424
                 -----
                 16065 ) 20808 ( 1
                         16065
                         -----
                          4743 ) 16065 ( 3
                                 14229
                                 -----
                                  1836 ) 4743 ( 2
                                         3672
                                         ----
                                         1071 ) 1836 ( 1
                                                1071
                 ---------------------------------------
                   765 ) 1071 ( 1                765
                         765
                         ---
                         306 ) 765 ( 2
                               612
                               ---
                               153 ) 306 ( 2
                                     306
                                     ---
```

H. C. F. is 153.

(87) $7\cdot\dot{5}\dot{7} \times \cdot3\dot{6} = \frac{750}{99} \times \frac{33}{90} = \frac{25}{9}$
$2\cdot3\dot{4}\dot{5} = \frac{2322}{990} = \frac{258}{110} = \frac{129}{55}$
∴ result $= \frac{25}{9} - \frac{129}{55} = \frac{214}{495} = \cdot4\dot{3}\dot{2}.$

(88) $\frac{1323}{61} = 21\frac{42}{61}.$

(89) In 12 months he spends 2 × (£250. 10*s.*) = £501;
in 12 months he spends 3 × (£125. 5*s.*) = £375. 15*s.*;
∴ he lays by £501 − £375. 15*s.*, or, £125. 5*s.*

(90) $1080 + \frac{2}{5} + \frac{5}{9} + \frac{2}{45} = 1080 + \frac{45}{45} = 1081$
$1081 - 81\frac{7}{13} = 1000 - \frac{7}{13} = 999\frac{6}{13}.$

(91) $\frac{76{\cdot}57}{{\cdot}0019} = \frac{765700}{19} = 40300$
$\frac{3}{7}$ of $\cdot0008568 = 3 \times \cdot0001224 = \cdot0003672$
$40300 \times \cdot0003672 = 14{\cdot}79816.$

(92) $\cdot0075 = \frac{75}{10000} = \frac{15}{2000} = \frac{3}{400}$
$\cdot1\dot{3}\dot{6} = \frac{135}{990} = \frac{15}{110} = \frac{3}{22}$
$\cdot\dot{0}0\dot{9} = \frac{9}{999} = \frac{1}{111}.$

(93) Annual cost = 36 × (£1 + 3*s.* 4*d.* + 2*s.* $2\frac{2}{3}$*d.* + 1*s.* 4*d.*)
= 36 × (£1. 6*s.* $10\frac{2}{3}$*d.*) = £48. 8*s.*

(94) Number of steps $= \frac{4\frac{3}{4} \times 1760 \times 36}{32} = \frac{19 \times 1760 \times 9}{32} = 9405.$

(95)
```
cwt.  qr.  lb.  oz.
 17 . 3 . 15 . 8
  4
 ---
 71
 28
 ---
 583
142
 ----
2003
  16
 ----
32056
   16
------
192336
32056
------
512896
```

(96) One gets 4 parts when the other gets 3 parts, and we must therefore divide the sum into 7 equal parts, each of which will be £1. 0*s.* $11\frac{1}{4}$*d.*, and give 4 parts, or, £4. 3*s.* 9*d.*, to one, and 3 parts, or, £3. 2*s.* $9\frac{3}{4}$*d.*, to the other.

(97) $\frac{41}{162} - \frac{3}{54} - \frac{9}{49} = \frac{32}{162} - \frac{9}{49} = \frac{55}{3969}$

$\frac{4}{9} + \frac{1}{2} - \frac{3}{14} = \frac{4}{9} + \frac{4}{14} = \frac{46}{63}$

$\frac{55}{3969} \div \frac{46}{63} = \frac{55 \times 63}{3969 \times 46} = \frac{55}{63 \times 46} = \frac{55}{2898}.$

```
2898 ) 55·0000 ( ·0189
       2898
       ————
       26020
       23184
       —————
        28360
        26082
        —————
         2278
```

```
(98)       238·7
            14·1
           —————
            2387
           9548
          2387
          ——————
1·023 ) 3365·67 ( 3290
        3069
        ————
         2966
         2046
         ————
          9207
          9207
          ————
```

(99) He spends in a day $\frac{£26.\ 8s.}{30}$, or, $\frac{£4.\ 8s.}{5}$;

∴ in 365 days he spends 73 × (£4. 8*s*.), or, £321. 4*s*.;

∴ he saves £78. 16*s*.

(100) $\frac{12}{9} \times (\frac{22}{9} + \frac{68}{9}) = \frac{12}{9} \times \frac{90}{9} = \frac{40}{3}$

$\frac{2341}{990} - \frac{1681}{990} = \frac{660}{990} = \frac{66}{99} = \frac{2}{3}$

$\frac{40}{3} + \frac{2}{3} = \frac{42}{3} = 14.$

	tons		cwt.		qr.		lb.		oz.		dr.
(101)	3	.	11	.	3	.	27	.	8	.	4

20

—

71

4

—

287

28

—

2323

574

—

8063

16

—

129016

16

—

2064260

(102) *A*'s money = £1529 − £400 = £1129.

(103) 128) 384 (3
384

—

128) 768 (6
768

—

∴ H. C. F. is 128.

128) 2304 (18
128

—

1024
1024

—

Hence L. C. M. = 128 × 18 = 2304.

(104) 1|52|39|90|25 (12345
1

22	52 44
243	839 729
2464	11090 9856
24685	123425 123425

5) He gets on an average 5*d.* a week;

∴ he gets (5 × 4 × 39)*d.*, or, £3. 5*s.*

$$\begin{array}{r}
625\,)\,75445\cdot000\,(\,120\cdot712\\
625\\
\hline
1294\\
1250\\
\hline
4450\\
4375\\
\hline
750\\
625\\
\hline
1250\\
1250\\
\hline
\end{array}$$

(106)

$$\begin{array}{r}
\cdot5678\\
\cdot08765\\
\hline
28390\\
34068\\
39746\\
45424\\
\hline
\cdot049767670
\end{array}$$

(107)

	£	s.	d.	
	164 .	0 .	0	= cost at £1 each.
4*s*. = $\frac{1}{5}$ of £1	32 .	16 .	0	= . . . . . . 4*s*. . . . .
4*s*. = $\frac{1}{5}$ of £1	32 .	16 .	0	= . . . . . . 4*s*. . . . .
4*d*. = $\frac{1}{12}$ of 4*s*.	2 .	14 .	8	= . . . . . . 4*d*. . . . .
1*d*. = $\frac{1}{4}$ of 4*d*.		13 .	8	= . . . . . . 1*d*. . . . .
$\frac{1}{2}$*d*. = $\frac{1}{2}$ of 1*d*.		6 .	10	= . . . . . . $\frac{1}{2}$*d*. . . . .
	£233 .	7 .	2	= cost at £1. 8*s*. 5$\frac{1}{2}$*d*. each.

(108) 11 ro. 11 po. 11 yd. = 451 po. 11 yd. = 13653$\frac{3}{4}$ yd. = 122883$\frac{3}{4}$ ft. = 17695260 in.; also, fraction

$$= \frac{13653\frac{3}{4}}{3\times4840} = \frac{54615}{3\times4840\times4} = \frac{1655}{440\times4} = \frac{331}{352}.$$

(109)

$$\begin{array}{r}
\text{mi.}\\
\cdot1215625\\
1760\\
\hline
72937500\\
8509375\\
1215625\\
\hline
213\cdot9500000\text{ yds.}\\
36\phantom{00000\text{ yds.}}\\
\hline
128370\phantom{0\text{ yds.}}\\
64185\phantom{00\text{ yds.}}\\
\hline
7702\cdot20\text{ in.}
\end{array}$$

(110)

$$\begin{array}{r}
41\,)\,6892\cdot1\,(\,168\cdot1\\
41\\
\hline
279\\
246\\
\hline
332\\
328\\
\hline
41\\
41\\
\hline
\end{array}$$

$$\cdot\dot{1}4285\dot{7} = \frac{142857}{999999} = \frac{1}{7}$$

$$\cdot\dot{0}7692\dot{3} = \frac{76923}{999999} = \frac{1}{13}$$

$$\frac{1}{7}\times\frac{1}{13} = \frac{1}{91} = \cdot\dot{0}1098\dot{9}.$$

(111) We have to find the L. C. M. of 27×12 and 50, which is $27 \times 12 \times 25$; and $(27 \times 12 \times 25)d.$, i.e., (27×6) dollars, or, 162 dollars is the debt required.

(112) The whole amount of their remaining money is £13. 7*s.* 3*d.*, and hence each of the three ought to have £4. 9*s.* 1*d.*;

∴ *A* has to hand over to *C* £7. 3*s.* 6*d.* − £4. 9*s.* 1*d.*, or, £2. 14*s.* 5*d.*;

∴ *B* has to hand over to *C* £4. 10*s.* − £4. 9*s.* 1*d.* or, 11*d.*

(113) $\frac{1}{6} + \frac{3}{10} + \frac{4}{15} + \frac{1}{35} = \frac{35+63+56+6}{210} = \frac{16}{21}$;

$\frac{3}{14} - \frac{4}{7} + \frac{15}{8} = \frac{12-32+105}{56} = \frac{117-32}{56} = 1\frac{29}{56}$.

(114) $\frac{5\times42}{6}s. = 35s.$, and $\frac{3\times80}{4}d. = 5s.$;

∴ fraction $= \frac{35-5}{60} = \frac{30}{60} = \frac{1}{2}$.

(115)

$$\begin{array}{r|l}
 & 5|31|11|81|16\ (23046 \\
 & 4 \\
\hline
43 & 131 \\
 & 129 \\
\hline
4604 & 21181 \\
 & 18416 \\
\hline
46086 & 276516 \\
 & 276516 \\
\hline
\end{array}$$

(116)

$$\begin{array}{l|rrrl}
 & £ & s. & d. & \\
 & 1\,. & 13\,. & 4 & = \text{cost of 1 cwt.} \\
 & & & 10 & \\
\hline
 & 16\,. & 13\,. & 4 & = \ldots\ldots\ 10\text{ cwt.} \\
 & & & 10 & \\
\hline
 & 166\,. & 13\,. & 4 & = \ldots\ldots\ 100\text{ cwt.} \\
 & 116\,. & 13\,. & 4 & = \ldots\ldots\ 70\text{ cwt.} \\
 & 8\,. & 6\,. & 8 & = \ldots\ldots\ 5\text{ cwt.} \\
\hline
14\text{lb.} = \frac{1}{8}\text{ of 1 cwt.} & 291\,. & 13\,. & 4 & = \ldots\ldots\ 175\text{ cwt.} \\
8\text{oz.} = \frac{1}{28}\text{ of 14lb.} & & 4\,. & 2 & = \ldots\ldots\ 14\text{ lb.} \\
4\text{oz.} = \frac{1}{2}\text{ of 8 oz.} & & & 1\frac{11}{14} & = \ldots\ldots\ 8\text{ oz.} \\
 & & & \frac{25}{28} & = \ldots\ldots\ 4\text{ oz.} \\
\hline
 & £291\,. & 17\,. & 8\frac{19}{28} & = \text{cost of 175 cwt. 14 lb. 12 oz.}
\end{array}$$

(117) £17. 9*s*. $8\frac{1}{4}$*d*. = 16785*q*.; and £1. 18*s*. $10\frac{1}{4}$*d*. = 1865*q*.;
∴ number of yards = $\frac{1865 \times 45}{16785} = \frac{45}{9} = 5$.

(118) $\frac{\cdot 00918}{\cdot 017} = \frac{9 \cdot 18}{17} = 54$; $\frac{\cdot 00918}{170} = \cdot 000054$.

(119)

£	s.	d.
37	18	$2\frac{3}{4}$
		9
341	4	$0\frac{3}{4}$
		9
3070	16	$6\frac{3}{4}$
18	19	$1\frac{3}{8}$
3089	15	$8\frac{1}{8}$

(120)
10203509
9856007

20059516 sum
347502 difference

19712014

(122)
14·94
·0093
100·
26·005

140·9543

$\frac{\cdot 025075}{1 \cdot 003} = \frac{25 \cdot 075}{1003} = \cdot 025$

·025 × 1000 = 25.

(121) Number of pins = 20000 × 20 × 112 × 16 × 200
= 143360000000.

(123)

	cwt.	qr.	lb.	oz.
$\frac{3}{5}$ of a ton =	12	0	0	0
$\frac{5}{8}$ of a cwt. =		2	14	0
$\frac{2}{3}$ of a lb. =				$10\frac{2}{3}$
	12	2	14	$10\frac{2}{3}$

12 | 6·75
30 | 51·5625
1·71875

(124)

	£	s.	d.	
	4	10	0	= cost of 1 cwt.
			5	
2 qr. = $\frac{1}{2}$ of 1 cwt.	22	10	0	= cost of 5 cwt.
14 lb. = $\frac{1}{4}$ of 2 qr.	2	5	0	= …… 2 qr.
7 lb. = $\frac{1}{2}$ of 14 lb.		11	3	= …… 14 lb.
		5	$7\frac{1}{2}$	= …… 7 lb.
	£25	11	$10\frac{1}{2}$	= cost of 5 cwt. 2 qr. 21 lb.

(125)
```
        74|68|·41|64 ( 86·42
        64
       ----
  166 | 1068
      |  996
      |-----
 1724 |  7241
      |  6896
      |------
17282 |  34564
      |  34564
      |-------
```

(126) If 8 oz. be worth ·5625*s.*;

1 lb. is worth (·5625 × 2)*s.*, or, 1·125*s.*, or, $1\frac{1}{8}$*s.*;

∴ 1 cwt. is worth $\frac{9 \times 112}{8}$*s.*, or, 126*s.*;

∴ ·75 of ton, that is 15 cwt., is worth (126 × 15)*s.*, or, £94. 10*s.*

(127) 247131012; one billion two hundred and forty-seven thousand six hundred and eighty-one millions three hundred and fifty-four thousand two hundred and eleven.

(128) 5 cwt. 3 qr. 18 lb. 8 oz. = 10600 oz.;

12 cwt. 2 qr. 14 lb. 6 oz. = 22630 oz.

∴ cost in pence = $\frac{5850 \times 22630}{10600}$*d.* = $\frac{1323855}{100}$*d.* = $12489\frac{21}{106}$*d.*

= £52. 0*s.* $9\frac{21}{106}$*d.*

(129) $\left(\frac{7}{3} + \frac{4 \times 10 \times 3}{5 \times 3 \times 4} - \frac{5}{2}\right) \div \frac{55}{5 \times 6} = \frac{11}{6} \times \frac{6}{11} = 1.$

(130)
```
 ·024        525 ) 249900 ( 476           d.
1·04               2100                1·045
-----              ----                 1290
   96              3990                -----
  24               3675                94050
------             ----               2090
·02496              3150             1045
                    3150            --------
                    ----        d. 1348·050
                                = £5. 12s. 4·05d.
```

(131) $\frac{2\times4\times5\times9}{3\times5\times3\times16}$ of £2. 5*s.* 6*d.* = $\frac{1}{2}$ of £2. 5*s.* 6*d.* = £1. 2*s.* 9*d.*

(132) $\frac{3}{10}$ of the ship costs £4000;
∴ the ship costs £$\frac{40000}{3}$;
∴ $\frac{3}{40}$ of the ship costs £$\frac{3\times40000}{40\times3}$, or, £1000.

(133) In 1 hour the work is done by (24 × 12 × 10) men; in 80 hours the work is done by $\frac{24\times12\times10}{80}$ men, or, 36 men;
∴ (3 × 36) men, or, 108 men will be required.

(134) $\frac{(\frac{10}{3}-\frac{5}{2})\div\frac{5}{16}}{\frac{8}{3}\div\frac{3}{4}}=\frac{\frac{5}{6}\times\frac{16}{5}}{\frac{32}{9}}=\frac{8\times9}{3\times32}=\frac{3}{4}=\cdot75.$

(135) $\frac{\cdot3\times147}{\cdot00000015}=\frac{3\times1470000000}{15}=29400000.$

(136)
$$\begin{array}{lrr} & s. & d. \\ \frac{5}{9}\text{ of }21s.=\frac{35}{3}s.= & 11 & 8 \\ \frac{3}{16}\text{ of }20s.=\frac{15}{4}s.= & 3 & 9 \\ \frac{5}{8}\text{ of }12d.=\frac{15}{2}d.= & & 7\frac{1}{2} \\ \hline & s.\ 16 & 0\frac{1}{2} \end{array}$$

(137)
$$\begin{array}{r|rrr|l} & £ & s. & d. & \\ & 2\ . & 17\ . & 6 & =\text{ cost of 1 cwt.} \\ & & & 12 & \\ \hline 2\text{ qr.}=\frac{1}{2}\text{ of 1 cwt.} & 34\ . & 10\ . & 0 & =\text{ cost of 12 cwt.} \\ 1\text{ qr.}=\frac{1}{2}\text{ of 2 qr.} & 1\ . & 8\ . & 9 & =\ \ldots\ldots\text{ 2 qr.} \\ 14\text{ lb.}=\frac{1}{2}\text{ of 1 qr.} & & 14\ . & 4\frac{1}{2} & =\ \ldots\ldots\text{ 1 qr.} \\ 2\text{ lb.}=\frac{1}{7}\text{ of 14 lb.} & & 7\ . & 2\frac{1}{4} & =\ \ldots\ldots\text{ 14 lb.} \\ & & 1\ . & 0\frac{9}{28} & =\ \ldots\ldots\text{ 2 lb.} \\ \hline & £37\ . & 1\ . & 4\frac{1}{14} & =\text{ cost of 12 cwt. 3 qr. 16 lb.} \end{array}$$

(138) $\frac{3}{10}$ of the estate is worth £450. 15*s.*;
∴ the estate is worth $\frac{10\times(£450\ 15s.)}{3}$;
∴ ·48 of the estate is worth $\frac{48\times10\times(£450\ 15s.)}{100\times3}$ = £721. 4*s.*

(139) 2 qr. 16$\frac{4}{5}$ lb. = 72$\frac{4}{5}$ lb.;
∴ fraction = $\frac{72\frac{4}{5}}{112}=\frac{364}{5\times112}=\frac{13}{20}=\cdot65.$
Also, since 1 ton costs $\frac{100}{13}$ × 52*s.* = £20;
∴ ·65 of $\frac{1}{20}$ of 1 ton costs £$\frac{20\times65}{20\times100}$ = 13*s.*

(140) $\dfrac{\frac{5}{4}-\frac{5}{12}}{\frac{5}{4}+\frac{5}{12}} + \frac{7\times9\times5}{6\times14\times3} - \frac{45}{4\times15} = \frac{10}{20} + \frac{5}{4} - \frac{3}{4} = 1$;

$\frac{2622}{33381} = \frac{874}{11127} = \frac{23\times38}{23\times49} = \frac{38}{49}$.

(141) $24{\cdot}0025 = \frac{240025}{10000} = \frac{48005}{2000} = \frac{9601}{400}$;

$\cdot0008125 = \frac{8125}{10000000} = \frac{1625}{2000000} = \frac{65}{80000} = \frac{13}{16000}$;

$\frac{1{\cdot}1214}{5{\cdot}34} = \frac{112{\cdot}14}{534} = \cdot21$;

$\frac{1121{\cdot}4}{\cdot534} = \frac{1121400}{534} = 2100$.

(142)
$$\begin{array}{rrr}
\pounds\cdot875 & \text{cr. } \cdot75 & s.\ 1{\cdot}625 \\
20 & 5 & 12 \\ \hline
s.\ 17{\cdot}500 & s.\ 3{\cdot}75 & d.\ 7{\cdot}500 \\
12 & 12 & 4 \\ \hline
d.\ 6{\cdot}000 & d.\ 9{\cdot}00 & q.\ 2{\cdot}000
\end{array}$$

∴ 17*s.* 6*d.* + 3*s.* 9*d.* − 1*s.* 7½*d.* = 19*s.* 7½*d.* ;
then since 19*s.* 7½*d.* = 235·5*d.* ;
and £1. 2*s.* 6*d.* = 270*d.* ;
∴ fraction = $\frac{235{\cdot}5}{270} = \frac{7{\cdot}85}{9} = \cdot87\dot{2}$.

(143) The shares, commencing with a seaman's, are as
1, 3, 10 ;
then (15 + 3 + 10) seamen's share = £399. 7*s.* ;
∴ a seaman's share = $\frac{\pounds399.\ 7s.}{28}$ = £14. 5*s.* 3*d.* ;
∴ the gunner's share = £42. 15*s.* 9*d.* ;
∴ the lieutenant's share = £142. 12*s.* 6*d.*

(144)
$$\begin{array}{l|rcl|l}
 & & s. & d. & \\
 & & 7\ . & 9 & = \text{value of 1 oz.} \\
 & & & 6 & \\ \hline
10\text{ dwt.} = \frac{1}{2}\text{ of 1 oz.} & & 46\ . & 6 & = \text{value of 6 oz.} \\
5\text{ dwt.} = \frac{1}{2}\text{ of 10 dwt.} & & 3\ . & 10\frac{1}{2} & = \ldots\ldots\ 10\text{ dwt.} \\
2\text{ dwt.} = \frac{1}{5}\text{ of 10 dwt.} & & 1\ . & 11\frac{1}{4} & = \ldots\ldots\ 5\text{ dwt.} \\
1\text{ dwt.} = \frac{1}{2}\text{ of 2 dwt.} & & & 9\frac{3}{10} & = \ldots\ldots\ 2\text{ dwt.} \\
12\text{ gr.} = \frac{1}{2}\text{ of 1 dwt.} & & & 4\frac{13}{20} & = \ldots\ldots\ 1\text{ dwt.} \\
6\text{ gr.} = \frac{1}{2}\text{ of 12 gr.} & & & 2\frac{13}{40} & = \ldots\ldots\ 12\text{ gr.} \\
2\text{ gr.} = \frac{1}{3}\text{ of 6 gr.} & & & 1\frac{13}{80} & = \ldots\ldots\ 6\text{ gr.} \\
 & & & \frac{31}{80} & = \ldots\ldots\ 2\text{ gr.} \\ \hline
 & \pounds2\ . & 13\ . & 9\frac{23}{40} & = \text{cost of 6 oz. 18 dwt. 20 gr.}
\end{array}$$

(145)

$$\begin{array}{r|l} \multicolumn{2}{l}{1|67\cdot|96|16\,(\,12\cdot96} \\ \multicolumn{2}{l}{1} \\ \hline 22 & 67 \\ & 44 \\ \hline 249 & 2396 \\ & 2241 \\ \hline 2586 & 15516 \\ & 15516 \\ \hline \end{array}$$

$$\sqrt{\frac{529}{2401}} = \frac{\sqrt{529}}{\sqrt{2401}} = \frac{23}{49}$$

(146) $\dfrac{\frac{1}{16} \text{ of } 120 + \frac{4}{9} \text{ of } 63 + \frac{8}{15} \text{ of } 30}{309} = \frac{7\cdot5+28+16}{309} = \frac{51\cdot5}{309}$

$= \cdot1\dot{6}.$

(147) $\frac{788}{241\times28} = \frac{197}{241\times7} = \frac{197}{1687}$;

10 ac. = (4840 × 10) sq. yd.;

∴ length of one side = 220 yd.;

∴ length of 4 sides = 880 yd.;

and $\frac{1760}{880} = 2$.

(148) Interest = £$\frac{880\times5\times9}{100\times4\times2}$ = £49·5 = £49. 10*s.*;

P. W. = £$\frac{800\times929\cdot5}{845}$ = £880;

∴ discount = £929. 10*s.* − £880 = £49. 10*s.*

(149) Cost = 41 {£1 + 3*s.* + 2*s.* 4*d.* + 1*s.* 4*d.*} = £54. 13*s.* 4*d.*

(150) From midnight on Sunday to 6 P.M. on Wednesday is 66 hours;

in 66 hours the clock loses 22 minutes;

∴ taking away the 10 minutes already gained, the clock stands at 12 minutes before 6, that is, at 5 h. 48 min.

(151) Cash received = £$\frac{1700\times96}{100}$ = £(17 × 96) = £1632;

annual income = £$\frac{1632\times5}{100}$ = £81·6 = £81. 12*s.*

(152) $\frac{747}{960} = \frac{249}{320} = \frac{24\cdot9}{32} = \frac{6\cdot225}{8} = \cdot778125$;

$\frac{2\times7\times11\times5}{5\times12\times21\times2} = \frac{11}{36} = \frac{2\cdot75}{9} = \cdot30\dot{5}$.

(153) $\frac{13\times125\times7\times8}{24\times150\times75} = \frac{5\times7}{3\times12\times3} = \frac{35}{108}$;
$\frac{14\times25\times75\times16}{15\times42\times108\times16} = \frac{5\times25}{3\times108} = \frac{125}{324}$;
∴ the sum $= \frac{105+125}{324} = \frac{230}{324} = \frac{115}{162}$.

(154) $(\cdot375 \times 21)s. = 7\cdot875s. = 7s.\ 10\frac{1}{2}d.$;
$\frac{54}{99}$ of $99d. = 54d. = 4s.\ 6d.$;
$\frac{27}{990}$ of $55s. = \frac{3}{2}s. = 1s.\ 6d.$;
$\left.\begin{array}{l}\therefore \text{ sum is } 13s.\ 10\frac{1}{2}d. = 333 \text{ halfpence} \\ \text{and } \pounds1.\ 11s.\ 6d. = 756 \text{ halfpence}\end{array}\right\}\therefore \text{ fraction} = \frac{333}{756} = \frac{37}{84}.$

(155) $\pounds\frac{2\frac{1}{4} \times 368\cdot75}{100} = \pounds\frac{33\cdot1875}{4} = \pounds8\cdot296875$;
$\frac{5}{240}$ of $\pounds368\cdot75 = \pounds\frac{368\cdot75}{48} = \pounds7\cdot682291\dot{6}$;
∴ difference $= \pounds\cdot614583\dot{3} = 12s.\ 3\frac{1}{2}d.$

(156) $\pounds40 = (11\cdot57 \times 40)$ guilders;
$= \frac{11\cdot57\times40\times101}{175}$ thalers;
$= \frac{11\cdot57\times40\times101\times7\cdot35}{175\times2}$ francs;
$= 981\cdot5988$ francs.

(157) Premium $= \frac{27}{240\times100}$ of $\pounds4325\cdot875 = \pounds\frac{9\times43\cdot25875}{80}$
$=\pounds\frac{38\cdot932875}{8} = \pounds4\cdot866609375 = \pounds4.\ 17s.\ 3\cdot98625d.$

(158) Interest $= \pounds\frac{845\cdot5\times6\times9}{200} = \pounds228\cdot285 = \pounds228.\ 5s.\ 8\cdot4d.$

(159) Interest $= \pounds\frac{2000\times3\times7}{400} = \pounds105$;
discount $= \frac{21}{421}$ of $\pounds2000 = \pounds99.\ 15s.\ 2\frac{418}{421}d.$;
∴ difference $= \pounds5.\ 4s.\ 9\frac{3}{421}d.$

(160) (1) $\frac{5\times4\times9\times16}{8\times3\times4\times5} = 6$;
(2) $\frac{17\times24}{12+8+21+10} - \frac{36\times5}{18\times5} = \frac{17\times24}{51} - \frac{36}{18} = 8 - 2 = 6.$

(161) $9\frac{1}{9} \times 9 = \frac{82}{9} \times 9 = 82$;
$9\frac{1}{9} \times 90 = \frac{82}{9} \times 90 = 820$;
$117 \times 9 = 1053.$

(162) Real distance = 22 yd. − $\frac{22\times5}{12}$ in. = 22 yd. − $9\frac{1}{6}$ in.
= 21 yd. 2 ft. $2\frac{5}{6}$ in.

(163) 13 po. 2 yd. 1 ft. 4 in. = 2662 in.;
1 fur. 36 po. 2 yd. 5 in. = 15125 in.;
∴ fraction = $\frac{2662}{15125} = \frac{22}{125}$ = ·176.
Again, $\frac{2\frac{1}{2}}{240} = \frac{5}{240\times2} = \frac{1}{48\times2} = \frac{1}{96}$.

(164)

```
      13|76|41 ( 371              ·40|00|00|00 ( ·6324
       9                            36
  67 | 476                  123  | 400
     | 469                       | 369
 741 |  741                 1262 | 3100
     |  741                      | 2524
                            12644|  57600
                                 |  50576
                                     7024
```

(165) Simple interest = £$\frac{21\cdot5\times3\times4}{100}$ = £2·58;
amount at compound interest = £$\frac{21\cdot5\times104\times104\times104}{100\times100\times100}$
= £24·184576;
∴ compound interest = £24·184576 − £21·5 = £2·684576;
∴ they are as 2·58 : 2·684576 = 2580000 : 2684576
= 1875 : 1951.

(166) P. W. = $\frac{100}{101}$ of £21·5 = £$\frac{2150}{101}$ = £21. 5*s.* $8\frac{92}{101}$*d.*

(167) Cost price = $\frac{100}{80}$ of £17·2 = £$\frac{172}{8}$ = £21. 10*s.*

(168) One gets 3 parts when the other gets 2 parts;
∴ $\frac{3}{5}$ of £5. 9*s.* $10\frac{3}{4}$*d.*, or, £3. 5*s.* $11\frac{1}{4}$*d.* is one man's share;
and $\frac{2}{5}$ of £5. 9*s.* $10\frac{3}{4}$*d.*, or, £2. 3*s.* $11\frac{1}{2}$*d.* is the other man's share.

(169) 16*s.* + $\frac{119}{12}$*s.* + $\frac{17}{4}$*s.* + $\frac{1375\times20}{1000}$*s.* + $\frac{21\times10}{90}$*s.*
= $(16 + \frac{119}{12} + \frac{17}{4} + \frac{55}{2} + \frac{7}{3})$*s.* = $\frac{720}{12}$*s.* = 60*s.* = £3.

(170) $3{\cdot}75$ of $100d. = 375d. = £1.\ 11s.\ 3d.$;
$\frac{54}{90}$ of $55s. = \frac{3}{5}$ of $55s. = £1.\ 13s.$;
$\frac{27}{999}$ of $222d. = \frac{3}{111}$ of $222d. = 6d.$;
∴ sum is $£3.\ 4s.\ 9d.$;
and fraction $= \frac{777}{1739} = \frac{21}{47}$.

(171) $\frac{2}{100}$ of $£455\frac{5}{6} = £\frac{2735}{300} = £9{\cdot}11\dot{6}$;
$\frac{4\cdot5}{240}$ of $£455\frac{5}{6} = £\frac{45 \times 2735}{2400 \times 6} = £\frac{547}{64} = £8{\cdot}546875$;
∴ difference $= £{\cdot}569791\dot{6} = 11s.\ 4\frac{3}{4}d.$

(172) $£10 = 252$ francs
$= \frac{252 \times 19}{2 \times 35}$ thalers
$= \frac{252 \times 19 \times 107}{2 \times 35 \times 60}$ florins
$= 121{\cdot}98$ florins.

(173) $2\frac{1}{4} \times 5\frac{1}{3} = \frac{9 \times 16}{4 \times 3} = 12$;
∴ P. W. $= \frac{100}{112}$ of $£810\frac{5}{6} = £\frac{100 \times 4865}{112 \times 6} = £\frac{17375}{24}$
$= £723.\ 19s.\ 2d.$

(174) Money obtained by sale $= £\frac{3430 \times 85\frac{1}{2}}{100} = £\frac{343 \times 171}{20}$;
stock obtained by purchase $= £\frac{343 \times 171 \times 100}{20 \times 98} = £2992\frac{1}{2}$;
∴ 1st income $= £\frac{3430 \times 7}{200} = £120.\ 1s.$;
2nd income $= £\frac{2992\cdot5 \times 4}{100} = £119.\ 14s.$;
∴ difference $= 7s.$

(175) Cubic content of water $= \frac{93\cdot75 \times 112 \times 16}{1000}$ cub. ft.;
∴ depth $= \frac{93\cdot75 \times 112 \times 16}{1000 \times 8 \times 7}$ ft. $= \frac{93\cdot75 \times 32}{1000}$ ft. $= 3$ ft.

(176) $24 + \frac{1}{7} + \frac{1}{3} + \frac{3}{14} + \frac{1}{6} = 24 + \frac{36}{42} = 24\frac{6}{7}$;
$(\frac{82}{15} \times \frac{42}{41}) \div (\frac{3}{5} - \frac{1}{4}) = \frac{28}{5} \div \frac{7}{20} = 16$.

(177) $(\frac{2}{17} \times \frac{51}{8} \times 130) \div 195 = \frac{3 \times 65}{2 \times 195} = \frac{1}{2}$.

(178) He buys 112 lb. for £24;
∴ he buys 6144 lb. for $£\frac{6144 \times 24}{112}$, or, $£\frac{9216}{7}$;
∴ he gains $£1500 - £\frac{9216}{7}$, or, $£\frac{1284}{7}$ on an outlay of $£\frac{9216}{7}$
∴ he gains per cent $\frac{100 \times 1284}{9216}$, or, $13\frac{179}{192}$.

(179) $6\frac{2}{3} \times \frac{1}{12} \times 3\frac{3}{5} = \frac{20 \times 18}{3 \times 12 \times 5} = 2$;
$\therefore$ discount $= \frac{2}{102}$ of £68. 3*s.* 6*d.* = £1. 6*s.* $8\frac{14}{17}$*d.*

(180) For £1 income in the $3\frac{1}{2}$ per cents. I pay £$\frac{91 \times 2}{7}$, or, £26;
for £4 income in the $3\frac{1}{2}$ per cents. I pay 4 × £26, or, £104;
$\therefore$ the 4 per cents. is the better investment.
Again, investing £26 produces 235*d.* income;
$\therefore$ for an income of £470 I must invest £$\frac{26 \times 470 \times 240}{235}$, or,
£12480.

(181)

$$\begin{array}{r|l} & 1|79|82|81\ (\ 1341 \\ & 1 \\ \hline 23 & 79 \\ & 69 \\ \hline 264 & 1082 \\ & 1056 \\ \hline 2681 & \quad 2681 \\ & \quad 2681 \\ \hline \end{array} \qquad \begin{array}{r|l} & 2|\cdot 50|00|00\ (\ 1\cdot 581\ldots\ldots \\ & \cdot 1 \\ \hline 25 & 150 \\ & 125 \\ \hline 308 & 2500 \\ & 2464 \\ \hline 3161 & \quad 3600 \\ & \quad 3161 \\ \hline \end{array}$$

(182) (Feet in breadth)^2 + $(55)^2 = (78)^2$;
$\therefore$ (feet in breadth)^2 = $6084 - 3025 = 3059$;
$\therefore$ feet in breadth = $\sqrt{3059} = 55\cdot 3\ldots\ldots$

(183) $\frac{3\frac{1}{2} \times 5}{7\frac{1}{2} \times 21} = \frac{7 \times 5}{15 \times 21} = \frac{1}{9} = \cdot\dot{1}$.

(184) $25 + 30 + 42 = 97$;
$\therefore$ first town has to pay $\frac{25}{97}$ of £530, or, £$136\frac{58}{97}$;
second town has to pay $\frac{30}{97}$ of £530, or, £$163\frac{89}{97}$;
third town has to pay $\frac{42}{97}$ of £530, or, £$229\frac{47}{97}$.

(185) In 1 year £1600 gives £$\frac{166}{4\cdot 5}$;
$\therefore$ £100 gives £$\frac{166}{16 \times 4\cdot 5}$, or, £$\frac{83}{36}$, or, £$2\frac{11}{36}$.

(186) $\frac{\frac{7 \times 3 \times 3}{2 \times 14}}{\frac{3 \times 7 \times 2}{6 \times 7}} \div \frac{9}{14} = \frac{9}{4} \times \frac{14}{9} = 3\frac{1}{2}$.

(187) Area of two long sides = $(2 \times 3\frac{9}{24} \times 4\frac{9}{48})$ sq. ft.
$= \frac{16281}{576}$ sq. ft.;
area of two short sides = $(2 \times 3\frac{9}{24} \times 2\frac{7}{48})$ sq. ft.
$= \frac{8343}{576}$ sq. ft.;
area of top and bottom = $(2 \times 4\frac{9}{48} \times 2\frac{7}{48})$ sq. ft.
$= \frac{20703}{1152}$ sq. ft.;
∴ whole area = $\frac{69951}{1152}$ sq. ft. = $\frac{23317}{384}$ sq. ft.;
∴ cost = $\frac{23317 \times 23}{384 \times 4}d. = £1.\ 9s.\ 1\frac{227}{1536}d.$

(188) (2·75 × 2·5 × 9) sq. ft. = 61·875 sq. ft.;
61·875 sq. ft. − 9·45 sq. ft. = 52·425 sq. ft.

(189) $\frac{101015-1010}{99000} + \frac{55}{100} = \frac{100005}{990 \times 55} = \frac{6667}{3630}$.

(190) The up train takes $5\frac{1}{4}$ hours to perform the whole journey;
when the down train starts, the up train has been $3\frac{3}{4}$ hours on the road, and therefore it has finished $3\frac{3}{4} + 5\frac{1}{4}$, or, $\frac{15}{21}$ of the journey;
thus at 10 A.M. we have the up train and down train starting at opposite ends of $\frac{6}{21}$, or, $\frac{2}{7}$ of the whole distance;
their rates are as 21 to 13;
∴ down train goes $\frac{21}{34}$ of $\frac{2}{7}$ of the whole distance, or, $\frac{3}{17}$ of the distance when they meet;
and the down train goes over $\frac{3}{17}$ of the distance in $\frac{3}{17}$ of $3\frac{1}{4}$ hours, or, $\frac{39}{68}$ hr., or, $34\frac{7}{17}$ min.;
∴ they meet at 10 hr. $34\frac{7}{17}$ min.

(191) $\dfrac{5-\frac{14 \times 5}{5 \times 3}}{\frac{7 \times 8}{9 \times 5}-\frac{41}{45}} - \dfrac{\frac{11}{5}}{\frac{4}{5}+\frac{7}{5}} = \dfrac{5-\frac{14}{3}}{\frac{56-41}{45}} - \frac{11}{11} - \frac{15}{15} - 1 = 0.$

(192)
$$\begin{array}{r|l} 12 & 8{\cdot}25 \\ \hline 100 & 17{\cdot}6875 \\ \hline & {\cdot}176875 \end{array}$$

$\cdot 176875 = \frac{176875}{1000000} = \frac{283}{1600}$.

(193) Value of the whole vessel is $\frac{7}{4}$ of 1342*s.*;

∴ value of $\frac{2}{11}$ of the vessel is $\frac{2\times7\times1342}{4\times11}$*s.*, or, £21. 7*s.*

(194) $(3\cdot145 \times 69\cdot5)$ mi. $= 218\cdot5775$ mi. $=$ 218 mi. 4 fur. $24\cdot8$ po;

$\frac{3145-31}{990}$ of 275*d.* $= \frac{3114\times5}{18}$*d.* $=$ £3. 12*s.* 1*d.*

(195) The faster vessel performs the voyage in 120 hours; the slower vessel performs the voyage in $(120+36)$ hr., or, 156 hr.;

∴ her average rate is $\frac{1200}{156}$ mi., or, $7\frac{9}{13}$ mi.

(196)

```
         1|67|96|16 ( 1296               12|96 ( 36
         1                                9
    22 | 67                          66 | 396
       | 44                             | 396
   249 | 2396
       | 2241
  2586 | 15516
       | 15516
```

∴ 36 is the fourth root.

(197) Area of floor $= (27\frac{1}{3} \times 20\frac{1}{6})$ sq. ft. $= \frac{82\times121}{3\times6}$ sq. ft.;

matting required $= \frac{82\times121\times9}{22\times3\times6}$ ft. $= \frac{41\times11}{2\times3}$ yd. $= 75\frac{1}{6}$ yd.

(198) $\dfrac{\frac{5\times9}{4\times5}-\frac{5\times6}{3\times5}}{\frac{7}{4}+\frac{17\times3}{34\times4}} \div \frac{2}{17} = \dfrac{\frac{9}{4}-\frac{6}{3}}{\frac{7}{4}+\frac{3}{8}} \times \frac{17}{2} = \frac{2}{17} \times \frac{17}{2} = 1.$

(199) $\frac{2}{5} \times \frac{5}{4}$, or, $\frac{1}{2}$ of the estate is worth £300;

∴ $\frac{5\times14}{5\times2}$, or, 7 times the estate is worth £4200.

(200) Selling price $= \frac{110}{100}$ of 15*s.* $= 16\cdot5$*s.* $=$ 16*s.* 6*d.*

(201) Cubic content $= (27 \times 1\frac{3}{4} \times 1\frac{1}{6})$ cub. ft. $= \frac{49}{24}$ cub. yd.;

∴ cost of timber $= \frac{49\times4}{24}$*s.* $= \frac{49}{6}$*s.* $=$ 8*s.* 2*d.*

(202) $\frac{11}{13} + \frac{1}{15} = \frac{165+13}{13\times15} = \frac{178}{195}$;

∴ $\frac{17}{195}$ of the cable is $234\frac{2}{3}$ yd.;

∴ length of cable $= \frac{195\times704}{17\times3} = 2691\frac{13}{17}$ yd.

(203) ac. ro. po. sq. yd.
4 . 3 . 14 . $26\frac{1}{2}$
4
19 ro.
40
774 po.
$30\frac{1}{4}$
$193\frac{1}{2}$
23220
$26\frac{1}{2}$
23440 sq. yd.
9
210960 sq. ft.
144
843840
843840
210960
30378240 sq. in.

yd. ft. in.
260 . 1 . 4
3
781 ft.
12
9376 in.

in. sq. in. in.
9376) 30378240 (3240
28128
22502
18752
37504
37504
0

and 3240 in. = 270 ft.

(204) $\frac{1080}{37250360} = \frac{108}{3725036} = \cdot 0000289\ldots$

(205) 1 qr. 13 lb. $7\frac{1}{5}$ oz. = 41 lb. $7\frac{1}{5}$ oz. = $663\frac{1}{5}$ oz.;
∴ fraction $= \frac{3316}{5 \times 20 \times 4 \times 28 \times 16} = \frac{829}{44800}$.

(206) $1\cdot 23 \times \cdot 0059 = \cdot 007257$;
$\frac{\cdot 007257}{\cdot 005} = \frac{7\cdot 257}{5} = 1\cdot 4514$.

(207)

	2		16|777|216
			8
6	5	1200 325 1525 25	8777 7625
75	6	187500 4536	1152216
		192036	1152216

(208) Insurance = $\frac{1}{12}$ of £3561. 11*s*. $7\frac{1}{2}$*d*. = £296. 15*s*. $11\frac{5}{8}$*d*.

(209) 65 nap. = £$\frac{65\times20\cdot8}{25\cdot45}$ = £$\frac{65\times2080}{2545}$ = £$53\frac{63}{509}$.

(210) 800 + 756 + 404 = 1960;
∴ Portsmouth sends $\frac{800}{1960}$ of 490, or, 200;
Plymouth sends $\frac{756}{1960}$ of 490, or, 189;
Sheerness sends $\frac{404}{1960}$ of 490, or, 101.

(211) Principal = $\frac{100}{5}$ of £341. 5*s*. = £6825.

(212) $24 + \cdot24 + \cdot024 + 1\cdot0024 = 25\cdot2664$;
$\frac{252664}{10000} = \frac{63166}{2500} = \frac{31583}{1250}$.

(213) (*a*) $\frac{72\cdot36}{3\cdot6} = \frac{723\cdot6}{36} = 20\cdot1$;
$\frac{72\cdot36}{\cdot0036} = \frac{723600}{36} = 20100$.

(*β*) $\frac{4\cdot4+\cdot6}{7\cdot375-\cdot125+\cdot75} = \frac{5}{8} = \cdot625$.

(*γ*) $\frac{2\times21}{9}$*s*. + $\frac{2\times20}{8}$*s*. + $\frac{1\times5}{2}$*s*. + $\frac{5}{24}$*s*. = $\frac{357}{24}$*s*.;
∴ first fraction = $\frac{357}{24\times20} = \frac{17\cdot85}{24} = \cdot74375$;
second fraction = $\frac{\cdot74375}{100} = \cdot0074375$.

(214) We have to find the hypotenuse of a right-angled triangle, of which the other sides are 72 miles and 54 miles;
∴ distance = $\sqrt{}$ (5184 + 2716) miles = $\sqrt{}$ (8100) miles = 90 miles.

(215) (*a*) Interest on £$416\frac{2}{3}$ for 1 year = £$\frac{1250\times4}{3\times100}$ = £$16\frac{2}{3}$;
interest on £$433\frac{1}{3}$ for 1 year = £$\frac{1300\times4}{3\times100}$ = £$17\frac{1}{3}$;
∴ simple interest = £$33\frac{1}{3}$; compound interest = £34;
∴ difference is 13*s*. 4*d*.

(*β*) £12. 16*s*. is the interest on £213. 6*s*. 8*d*. for $1\frac{1}{2}$ years;
∴ interest on £$213\frac{1}{3}$ for 1 year is £$\frac{2\times12\cdot8}{3}$;
∴ interest on £100 for 1 year is £$\frac{100\times2\times12\cdot8\times3}{640\times3}$ = £4.

(216) Area of walls = $\{(48+40) \times 14\frac{1}{4}\}$ sq. ft. = 1254 sq. ft.
deductions = $\{(8 \times 5\frac{1}{4} \times 4) + (10 \times 6\frac{2}{3} \times 2) + (6\frac{1}{2} \times 5)\}$ sq. ft. = $333\frac{5}{6}$ sq. ft.;
∴ area of paper = $(1254 - 333\frac{5}{6})$ sq. ft. = $920\frac{1}{6}$ sq. ft.;
∴ length of paper = $\frac{5521 \times 2}{5 \times 6}$ ft. = $\frac{5521}{45}$ yd.;
∴ cost of paper = $\frac{5521 \times 45}{45}q.$ = $5521q.$ = £5. 15*s.* $0\frac{1}{4}$*d.*

(217)

$$\begin{array}{rrrrr}
 & £ & s. & d. & \\
 & 217 & .\ 11 & .\ 4 & \\
 & & & 21\frac{3}{4} & \\
\hline
4 & 652 & .\ 14 & .\ 0 & \\
\hline
 & 163 & .\ \ 3 & .\ 6 & \\
 & 4568 & .\ 18 & .\ 0 & \\
\hline
 & 4732 & .\ \ 1 & .\ 6 &
\end{array}$$

14 lb. = $\frac{1}{2}$ of 1 qr.

7 lb. = $\frac{1}{2}$ of 14 lb.
2 lb. = $\frac{1}{7}$ of 14 lb.
1 lb. = $\frac{1}{2}$ of 2 lb.

$$\begin{array}{rrr}
£ & s. & d. \\
1\ . & 2\ . & 4 \\
 & & 271 \\
\hline
302\ . & 12\ . & 4 \\
 & 11\ . & 2 \\
 & 5\ . & 7 \\
 & 1\ . & 7\frac{1}{7} \\
 & & 9\frac{4}{7} \\
\hline
303\ . & 11\ . & 5\frac{5}{7}
\end{array}$$

(218) 3 ro. 7 po. 28 yd. 2 ft. 36 in. = 5015520 sq. in.;
1 ac. 31 po. 27 yd. 2 ft. 36 in. = 7523280 sq. in.;
∴ fraction = $\frac{501552}{752328} = \frac{2}{3} = \cdot\dot{6}$.

(219) $\cdot 0\dot{1}\dot{4} = \frac{14}{990} = \frac{7}{495}$; and $\cdot 1\dot{0}5\dot{0} = \frac{1048}{9990}$.

$$\begin{array}{r|l}
 & 184\cdot117761\ (\ 13\cdot569 \\
 & 1 \\
\hline
23 & 84 \\
 & 69 \\
\hline
265 & 1511 \\
 & 1325 \\
\hline
2706 & 18677 \\
 & 16236 \\
\hline
27129 & 244161 \\
 & 244161 \\
\hline
\end{array}$$

(220) Interest $= £\frac{127750 \times 60 \times 7}{100 \times 365 \times 2} = £\frac{350 \times 60 \times 7}{100 \times 2} = £735$;
P. W. $= \frac{1600}{1717}$ of £1302. 1*s.* 2*d.* = £1213. 6*s.* 8*d.*;
∴ discount = £1302. 1*s.* 2*d.* − £1213. 6*s.* 8*d.* = £88. 14*s.* 6*d.*

(221) Area of paper $= \{(42+33) \times 10\frac{1}{4}\}$ sq. ft. $= \frac{3075}{4}$ sq. ft.;
cost of paper $= \frac{3075 \times 13}{4 \times 9 \times 2}d. = 555\frac{5}{24}d. = £2.\ 6s.\ 3\frac{5}{24}d.$

(222) £100 amounts in the time to £135;
∴ sum required $= \frac{100}{135}$ of £425. 19*s.* $4\frac{4}{5}d.$ = £315. 10*s.* 8*d.*

(223) Income $= (5\frac{7}{32} \times 529 \times 60)s. = \frac{1325145}{8}s.$
$= £8282.\ 3s.\ 1\frac{1}{2}d.$

(224) The old tax was $£\frac{1}{60}$ in the pound;
the new tax is therefore $£\frac{1}{40}$ in the pound;
∴ sum paid is $\frac{1}{40}$ of £345. 10*s.*, or, £8. 12*s.* 9*d.*

(225) 188 tons 13 cwt. 2 qr. 19 lb. 14 oz.

(226)
$$\begin{array}{rcrcr} £ & & s. & & d. \\ 8 & . & 1 & . & 1\frac{1}{2} \\ & & & & 9 \\ \hline 72 & . & 10 & . & 1\frac{1}{2} \\ & & & & 9 \\ \hline 652 & . & 11 & . & 1\frac{1}{2} \\ & & & & 7 \\ \hline £4567 & . & 17 & . & 10\frac{1}{2} \end{array}$$

(227) 1 cwt. costs $\frac{3969 \times 64}{9}d.$, or, $(441 \times 64)d.$
∴ 1 oz. costs $\frac{441 \times 64}{112 \times 16}d.$, or, 1*s.* $3\frac{3}{4}d.$

(228) Length of carpet $= \frac{26 \times 35}{2\frac{1}{3} \times 3}$ yd.
= 130 yd.

(229) $(\frac{271}{697} + \frac{5}{17}) \div \frac{7 \times 8}{41 \times 2} = \frac{476}{41 \times 17} \times \frac{41}{28} = \frac{476}{476} = 1.$

(230) $\frac{22{\cdot}5}{1{\cdot}5 \times 27 \times 1728} = \frac{5}{9 \times 1728} = \frac{5}{15552} = {\cdot}000321\ldots$

(231) Taxes $= \frac{12\frac{2}{5}}{100}$ of $£850 = £\frac{62 \times 850}{500} = £105.\ 8s.$;
∴ amount = £850 + £105. 8*s.* = £955. 8*s.*

(232) In 1 day they jointly mow $(\frac{5}{3} + \frac{7}{9} + \frac{11}{12})$ ac., or, $\frac{121}{36}$ ac.;
∴ they will take $(121 \div \frac{121}{36})$ days, or, 36 days.

(233) 360138569; three hundred and sixty millions, one hundred and thirty-eight thousand, five hundred and sixty-nine.

(234) $(\frac{8}{10} \text{ of } \frac{3}{5}) \div (\frac{10}{8} \text{ of } \frac{5}{3}) = \frac{12}{25} \div \frac{25}{12} = \frac{144}{625}$.

(235) $\frac{5 \times 21}{14}s. + \frac{5}{8}s. + \frac{5}{24}s. = 7s.\ 6d. + 7\frac{1}{2}d. + 2\frac{1}{2}d. = 8s.\ 4d.$;
$\frac{100}{240} = \frac{5}{12} = \cdot 41\dot{6}$.

(236) $\cdot 0214 \times 2\cdot 14 = \cdot 045796$;
$\frac{17\cdot 82}{\cdot 0011} = \frac{178200}{11} = 16200$;
$(\cdot 05 \times 20 + \cdot 3 \times 21 + \cdot 75 \times 5 + \cdot 8)s. = 11\cdot 85s.$
$= 11s.\ 10\frac{1}{5}d.$

(237)

	£	s.	d.	
5 dwt. = ¼ of 1 oz.	3	17	10	= cost of 1 oz.
			69	
	268	10	6	= cost of 69 oz.
2½ dwt. = ½ of 5 dwt.		19	5½	= . . . . . . 5 dwt.
		9	8¾	= . . . . . . 2 dwt. 12 gr.
	£269	19	8¼	= cost of 5 lb. 9 oz. 7 dwt. 12 gr.

(238) Express takes $(192 \div 40)$ hr., or, $4\frac{4}{5}$ hr.;
mail takes $(192 \div 28)$ hr., or, $6\frac{6}{7}$ hr.;
∴ time saved $= (6\frac{6}{7} - 4\frac{4}{5})$ hr. $= 2\frac{2}{35}$ hr.

(239) Interest $= £\frac{750 \times 3\frac{1}{4} \times \frac{4}{3}}{100} = £\frac{75 \times 13}{3 \times 10} = £32.\ 10s.$

(240) The first and second pay $\frac{1}{3} + \frac{6}{5}$ of $\frac{1}{3}$, or, $\frac{11}{15}$;
∴ $\frac{4}{15}$ of the bill = £2. 10*s*., and ∴ the bill is £9. 7*s*. 6*d*.

(241) $(\frac{4}{5} + \frac{13 \times 5}{11} \times \frac{11}{5} - \frac{6}{7}) \div \frac{453}{245}$;
$(\frac{4}{5} + 13 - \frac{6}{7}) \div \frac{453}{245} = \frac{453}{35} \times \frac{245}{453} = 7$.

(242) $2\cdot 45 \times \cdot 05 = \cdot 1225$;
$\frac{\cdot 0225}{2\cdot 5} = \frac{\cdot 225}{25} = \cdot 009$;
$\frac{25}{1000}$ of 2 qr. 6 lb. 4 oz. $= \frac{1}{40}$ of 62 lb. 4 oz. = 1 lb. 8·9 oz.

(243) The cargo is worth $\frac{7}{5}$ of £16000, or, £22400;
$\therefore$ $\frac{2}{3}$ of $\frac{7}{8}$ of $\frac{2}{7}$ of the cargo is worth £$\frac{22400}{6}$, or, £$3733\frac{1}{3}$.

(244) Thickness = $\frac{40\times27}{54\times5}$ ft. = 4 ft.

(245) $\frac{2\times25}{900}s. + \frac{63\times100}{900}s. - \frac{8\times9}{9\times4}s. = 1d. + 7s. - 2s. = 5s.\ 1d.$

(246) Cost = $\frac{21\times15\frac{5}{8}\times14\frac{2}{5}}{9}d. = \frac{7\times125\times72}{3\times5\times8}d.$ = £2. 3*s.* 9*d.*

(247) Selling price = $\frac{110}{100}$ of £12. 15*s.* = £14. 0*s.* 6*d.*

(248) It loses 2 min. 49 sec. in $6\frac{1}{2}$ days;
$\therefore$ in 1 day it loses $\frac{169\times2}{13}$ sec., or, 26 sec.

(249) $\frac{\frac{26}{51}}{\frac{13}{3}} \div \frac{\frac{3}{4}}{\frac{17}{4}} = \frac{26\times3\times17}{51\times13\times3} = \frac{2}{3}.$

(250) $\frac{4}{7}$ of $\frac{17\frac{1}{2}}{40} = \frac{4\times35}{7\times80} = \frac{1}{4}.$

(251) $\frac{250}{900}$ of 90*s.* = 25*s.* = £1. 5*s.*

(252) Value = $\frac{3\cdot5\times4\cdot5\times1\cdot5}{3}s. = 7\cdot875s. = 7s.\ 10\frac{1}{2}d.$

(253)

```
        1·014049 ( 1·007
        1
       ________
2007 |   14049
     |   14049
      ________
```

$\sqrt{175\frac{9}{16}} = \sqrt{\frac{2809}{16}} = \frac{53}{4} = 13\frac{1}{4}$

(254) *A*'s income = £$\frac{552\times3\frac{1}{4}}{92}$ = £(6 × $3\frac{1}{4}$) = £19. 10*s.*
B's income = £$\frac{679\times3}{97}$ = £(7 × 3) = £21.
$\therefore$ difference is £1. 10*s.*

(255) 1 man earns £1 in $\frac{5\times6}{8}$ days;
$\therefore$ 15 men earn £4 in $\frac{5\times6\times4}{8\times15}$ days, or, 1 day.

(256) One pipe fills $\frac{2}{3}$ in an hour;
∴ the other fills $\frac{1}{3}$ in an hour;
∴ it takes 3 hours to fill the vessel.

(257) The estate is worth $\frac{49}{4}$ of £46. 7*s.* 8*d.*;
∴ $\frac{2}{11}$ of it is worth $\frac{2\times49}{4\times11}$ of £46. 7*s.* 8*d.*, or, £103. 6*s.* 2*d.*

(258) Length of step $= \dfrac{3\frac{1}{2}\times1760\times36}{110\times60}$ in. $= \frac{7\times16\times18}{60}$ in.
$= 33{\cdot}6$ in.

(259) £100 gives £$(5\frac{1}{2} \times 3\frac{1}{4})$, or, £$\frac{143}{8}$ interest;
∴ sum required $=$ £$\frac{208\times8\times100}{143}$, or, £$\frac{16\times800}{11}$, or,
£1163. 12*s.* $8\frac{8}{11}$*d.*

(260) Area to be paved $= \{\, 850 \times (5\frac{1}{4} \times 2) \,\}$ sq. ft.
$= (425 \times 21)$ sq. ft.;
cost $= (425 \times 21 \times 15\frac{1}{4})$*d.* $=$ £567. 2*s.* $2\frac{1}{4}$*d.*

(261) $\frac{5\times112}{12}$ lb. $+ \frac{2\times28}{7}$ lb. $+ \frac{7}{8}$ lb. $= \frac{1333}{24}$ lb.
∴ fraction $= \frac{1333}{24\times112\times20} = \frac{16{\cdot}6625}{672} = {\cdot}02479538\ldots.$

(262) Thickness $= \frac{1728}{4026\times10000} = \frac{288}{671\times10000} = \frac{18}{419375}.$

(263) $\dfrac{\frac{11}{5} \div \frac{22}{7}}{\frac{1}{6} \times \frac{4}{7}} = \frac{11\times7\times6\times7}{5\times22\times4} = \frac{147}{20} = 7\frac{7}{20}.$

(264) $\frac{3}{14} \div 240 = \frac{1}{14\times80} = \frac{1}{1120}.$

(265) $\frac{15}{36} = {\cdot}41\dot{6}$; and $({\cdot}0208 \times 240)$*d.* $= 4{\cdot}992$*d.*

(266) $4 + 5 + 6 = 15$;
∴ *A*'s share $= \frac{4}{15}$ of £1000 $=$ £266. 13*s.* 4*d.*;
∴ *B*'s share $= \frac{5}{15}$ of £1000 $=$ £333. 6*s.* 8*d.*;
∴ *C*'s share $= \frac{6}{15}$ of £1000 $=$ £400.

(267) Hypotenuse $= \sqrt{(30^2 + 40^2)}$ ft. $= \sqrt{2500}$ ft. $= 50$ ft.

(268) Length of street + length of column = 8700 ft.;
∴ time $= \dfrac{8700}{58\times2\frac{1}{2}}$ min. $= 60$ min. $= 1$ hr.

(269) Length cut off $= \dfrac{2\frac{1}{2}}{1\frac{1}{3} \times 1\frac{1}{4}}$ ft. $= \frac{5\times3\times4}{2\times4\times5}$ ft. $= 1\frac{1}{2}$ ft.;

∴ length remaining is $16\frac{1}{2}$ ft.

(270) $\left(\dfrac{\frac{11}{4}+\frac{17}{5}}{\frac{21}{5}+\frac{21}{4}} + \dfrac{\frac{11}{3}}{\frac{21}{2}}\right) \times \left(\dfrac{\frac{26}{11}}{\frac{13}{5}} \div \dfrac{\frac{29}{11}}{\frac{87}{10}}\right) - \frac{281}{1405}$;

$= \left(\frac{55+68}{84+105} + \frac{22}{63}\right) \times \left(\frac{5\times2}{11} \times \frac{11\times87}{29\times10}\right) - \frac{1}{5}$;

$= \frac{123+66}{189} \times 3 - \frac{1}{5} = 1 \times 3 - \frac{1}{5} = 3 - \frac{1}{5} = 2\frac{4}{5}$.

		£	s.	d.	
	(271)	3	13	4	= cost of 1 ac.
				12	
		44	0	0	= ..... 12 ac.
				11	
		484	0	0	= ..... 132 ac.
		7	6	8	= ..... 2 ac.
2 ro. = $\frac{1}{2}$ of 1 ac.		491	6	8	= ..... 134 ac.
1 ro. = $\frac{1}{2}$ of 2 ro.		1	16	8	= ..... 2 ro.
16 po. = $\frac{1}{10}$ of 1 ac.			18	4	= ..... 1 ro.
			7	4	= ..... 16 po.
		£494	9	0	= cost of 134 ac. 3 ro. 16 po.

(272) $\frac{7}{8}$ of 50*s.* $= \frac{350}{8}$*s.* = 43*s.* 9*d.*

$\frac{1}{7}$ of £19. 6*s.* $5\frac{1}{2}$*d.* = £2. 15*s.* $2\frac{1}{2}$*d.*

$\frac{5}{24}$ of 5*s.* = 25 halfpence = 1*s.* $0\frac{1}{2}$*d.*;

∴ sum = £5.

(273) $\frac{33\times24}{9} \div \frac{4\times135}{3} = \frac{88}{4\times45} = \frac{22}{45} = \frac{4\cdot4}{9} = \cdot4\dot{8}$.

(274) Interest for 1 year $= \frac{1}{3}$ of £$13\frac{1}{8}$ = £$4\frac{3}{8}$;

∴ rate = £$\left(\frac{100}{125} \times \frac{35}{8}\right)$ = £$\frac{7}{2}$ = £$3\frac{1}{2}$.

(275) Money from sale = £$\frac{530\times86}{100}$ = £$\frac{53\times43}{5}$;

income from new investment = £$\frac{53\times43\times15}{5\times100\times4}$

= £17·0925;

income from old investment = £$\frac{530\times3}{100}$ = £15·9;

∴ increase = £1·1925 = £1. 3*s.* $10\frac{1}{5}$*d.*

(276) 54 boys in 280 hours do (54×280) times as much as 1 boy in 1 hour, and therefore $\frac{54 \times 280}{42}$ times as much as 42 boys in 1 hour;

hence the 42 boys must work $\frac{54 \times 280}{42}$ hours, or, 360 hours;

∴ each day they must work $\frac{360}{45}$ hours, or, 8 hours.

(277) Area of carpet $= (20 \times 16\frac{3}{4})$ sq. ft. $= 335$ sq. ft.

also, for 8 guineas we can buy $\frac{8 \times 21 \times 2}{7}$ yd., or, 48 yd.

and 48 yd. of carpet $\frac{3}{4}$ yd. wide will cover 36 sq. yd.;

∴ area uncovered $= (335 - 324)$ sq. ft. $= 11$ sq. ft.

(278) $\left\{\frac{7 \times 22 \times 46}{11 \times 23 \times 49} + \frac{360 \times 77}{49 \times 120}\right\} \div \left\{\frac{23}{7} + \frac{10 \times 86}{20 \times 129}\right\}$

$= \left(\frac{4}{7} + \frac{33}{7}\right) \div \left(\frac{23}{7} + \frac{1}{3}\right) = \frac{37}{7} \div \frac{76}{21} = 1\frac{35}{76}.$

(279) $\frac{129}{240} = \frac{43}{80} = \frac{4 \cdot 3}{8} = \cdot 5375;$

$\frac{50}{120} = \frac{5}{12}.$

(280) Interest $= £\frac{39 \cdot 625 \times 5 \cdot 5 \times 4}{100} = £8 \cdot 7175 = £8.\ 14s.\ 4\frac{1}{5}d.$

(281) 1 lb. costs $\frac{13 \times 8}{14 \times 7}s.$, or, $\frac{52}{49}s.$;

∴ $\frac{35}{12}$ cwt. costs $\frac{35 \times 112 \times 52}{12 \times 49}s.$, or, $£17.\ 6s.\ 8d.$

(282) $\cdot 4\dot{7} = \frac{43}{90}$; $\cdot 68\dot{4}9\dot{4} = \frac{68426}{99900} = \frac{34213}{49950}$;

$\cdot\dot{4}1\dot{3}$ cwt. $= \frac{413 \times 4}{999}$ qr. $= 1$ qr. $18\frac{302}{999}$ lb.

(283) Tin $= \frac{150}{4}$ lb. $= 37\frac{1}{2}$ lb.;

copper $= \frac{450}{4}$ lb. $= 112\frac{1}{2}$ lb.

(284) Area of carpet $= \frac{45 \times 19}{2 \times 9}$ sq. yd.;

length of carpet $= \frac{45 \times 19 \times 2}{2 \times 9}$ yd. $= 95$ yd.

(285) $\dfrac{\frac{3}{2} + \frac{7}{3}}{\frac{7}{3} + \frac{13}{4}} \div \dfrac{\frac{5}{7}}{1 + \frac{3}{7}} - \frac{\cdot 6}{6}$

$= \frac{18 + 28}{28 + 39} \div \frac{5}{10} - \frac{1}{10} = \frac{46 \times 10}{67 \times 5} - \frac{1}{10} = 1\frac{183}{670}.$

(286) $(\cdot 3 + \cdot 03 + \cdot 003 + \cdot 0003) \times 30000 = \cdot 3333 \times 30000$

$= 9999.$

$9999 \div \cdot 009 = \frac{9999000}{9} = 1111000.$

(287) Interest $= £\frac{750 \times 2\frac{3}{4} \times 3\frac{1}{4}}{100} = £\frac{15 \times 11 \times 13}{2 \times 4 \times 4} = £\frac{2145}{32}$

$= £67.\ 0s.\ 7\frac{1}{2}d.$

(288) $\frac{1\frac{1}{3} \times 20}{5} = \frac{16}{3} = 5 \cdot \dot{3}$;

$\frac{\frac{3}{4} \times 5 + \frac{7}{9} \times 10}{20} = \frac{\frac{15}{4} + \frac{70}{9}}{20} = \frac{415}{36 \times 20} = \frac{83}{144}$;

$(\cdot 02 \times 240 + \cdot 03 \times 90 + \frac{13}{900} \times 33)d.$

$= (4 \cdot 8 + 2 \cdot 7 + \cdot 47\dot{6})d. = 7 \cdot 97\dot{6}d.$

	£	s.	d.
(289)	1	7	9
			3
2 qr. = $\frac{1}{2}$ of 1 cwt.	4	3	3
1 qr. = $\frac{1}{2}$ of 2 qr.		13	$10\frac{1}{2}$
14 lb. = $\frac{1}{2}$ of 1 qr.		6	$11\frac{1}{4}$
2 lb. = $\frac{1}{7}$ of 14 lb.		3	$5\frac{5}{8}$
1 lb. = $\frac{1}{2}$ of 2 lb.			$5\frac{53}{56}$
			$2\frac{109}{112}$
	£5	8	$3\frac{33}{112}$

(290) Area of walls = (72 × 11) sq. ft. = 792 sq. ft.;
area of windows = (2 × 9 × 3) sq. ft. = 54 sq. ft.;
area of door = $(7 \times \frac{7}{2})$ sq. ft. = $24\frac{1}{2}$ sq. ft.;
area of fireplace = $(4 \times 4\frac{1}{2})$ sq. ft. = 18 sq. ft.;
∴ area to be papered = $695\frac{1}{2}$ sq. ft.;
length of paper = $(695\frac{1}{2} \div 2\frac{1}{4})$ ft. = $\frac{2782}{9}$ ft.;
cost $= \frac{2782 \times 9\frac{1}{2}}{9 \times 36}s. = £4.\ 1s.\ 6\frac{23}{27}d.$

(291) For 51*d.* I can have for 50 hours 5 burners;
1*d.* I can have for 1 hour $\frac{5 \times 50}{51}$ burners;
918*d.* I can have for 60 hours $\frac{5 \times 50 \times 918}{60 \times 51}$, or, 75 burners.

(292) $\frac{\frac{7}{2} + \frac{7}{3}}{\frac{3}{4} \times \frac{55}{6}} = \frac{\frac{35}{6}}{\frac{55}{8}} = \frac{35 \times 8}{6 \times 55} = \frac{28}{33}.$

(293) $\frac{1}{64} = \frac{\cdot125}{8} = \cdot015625$;
$\cdot015625 \times \cdot0064 = \cdot0001$.

(294) $\dfrac{\frac{5}{16} \text{ of } 40}{30} = \frac{5 \times 4}{16 \times 3} = \frac{5}{12}$.

(295)
$$\begin{array}{r|l} 12 & 11\cdot25 \\ \hline 3 & 3\cdot9375 \\ \hline 7 & 1\cdot3125 \\ \hline & \cdot1875 \end{array}$$

also, $\frac{3 \times 1}{4 \times 8}$ of $15d. = \frac{45}{32}d. = 1\frac{13}{32}d.$
$\therefore$ $3s.\ 11\frac{1}{4}d. - 1\frac{13}{32}d. = 3s.\ 9\frac{27}{32}d.$

(296) Content $= (26\frac{2}{3} \times 12\frac{3}{4} \times 1)$ cub. ft. $= \frac{80 \times 51}{3 \times 4}$ cub. ft.
$= 340$ cub. ft.

(297) $97 \times 25\frac{1}{4}s. = \frac{97 \times 101}{4}s. = \frac{9797}{4}s. = 2449\frac{1}{4}s. = £122.\ 9s.\ 3d.$

(298) 1 man can mow 1 acre in $\frac{60 \times 14}{35}$ hr.;
3 men can mow 24 acres in $\frac{60 \times 14 \times 24}{3 \times 35}$ hr., or, 192 hr.;
$\therefore$ they will do it in 16 days of 12 hours each.

(299) 3 times third son's share + £1575 + £5000 + £1575
= £17900;
$\therefore$ 3 times third son's share = £9750;
$\therefore$ third son had £3250; the second £4825; the eldest £9825.

(300) (i) $\frac{7 \times 15 \times 3 \times 16 \times 2}{8 \times 7 \times 4 \times 9 \times 5} = \frac{32}{32} = 1$;
(ii) $\dfrac{\frac{8}{7} \times \frac{14 \times 7}{3 \times 24} \times \frac{12}{7} \times \frac{5}{8}}{1 + \frac{2}{3}} = \dfrac{\frac{5}{3}}{\frac{5}{3}} = 1$.

(301) $\frac{7}{8} \times \frac{2}{9} \times 21s. = \frac{49}{12}s. = 4s.\ 1d.$;
$\frac{3237}{3 \times 20 \times 112} = \frac{1079}{20 \times 112} = \frac{1079}{2240}$.

(302) $\frac{\cdot0001}{\cdot00002} = \frac{10}{2} = 5$;
$\frac{1000}{\cdot0001} = \frac{10000000}{1} = 10000000$;
$\frac{1}{900} + \frac{1}{9990} = \frac{9990}{900} = 11\cdot1$.

(303) $\cdot 175 \times 20$ cwt. $= 3\cdot 5$ cwt. $= 3$ cwt. 2 qr.;
$\cdot 006785 \times 560d. = 3\cdot 7996d.$

(304) They lose $\frac{295}{960}$ of £4608, or, £$\frac{295 \times 48}{10}$, or, £1416.

(305) Area of surface $= (4 \times 24 \times 2 + 2 \times 2 \times 2)$ sq. ft.
$= 200$ sq. ft.;
cubical content $= 24 \times 2 \times 2 = 96$ cub. ft.

(306) $30712\cdot 5625\ (175\cdot 25$

$$\begin{array}{r|l}
 & 1 \\
\hline
27 & 207 \\
 & 189 \\
\hline
345 & 1812 \\
 & 1725 \\
\hline
3502 & 8756 \\
 & 7004 \\
\hline
35045 & 175225 \\
 & 175225 \\
\hline
\end{array}$$

also, $\sqrt{\frac{625}{2401}} = \frac{25}{49}$;
$\therefore$ first result is $\frac{17525}{100} \times \frac{25}{49} = \frac{17525}{196} = 89\frac{81}{196}$.

$$\sqrt{\frac{133225}{1000000000000}} = \frac{365}{1000000} = \cdot 000365$$

(307) Interest $= \frac{125 \times 2\frac{1}{2} \times 4}{100}$ gui. $= 12\frac{1}{2}$ gui. $=$ £13. 2*s.* 6*d.*;

P. W. $= \frac{100}{106\frac{1}{4}}$ of $1275s. = \frac{400 \times 1275}{425}s. = 1200s. =$ £60;
$\therefore$ discount is £3. 15*s.*

(308) $(\frac{112}{15} + \frac{18}{5}) \div (\frac{112}{15} - \frac{18}{5}) = \frac{166}{75} \div \frac{58}{75} = \frac{166}{58} = 2\frac{25}{29}$.

(309) Area of 6 sides $= 2\ (3\frac{1}{3} \times 4\frac{1}{6} + 3\frac{1}{3} \times 2\frac{1}{12} + 4\frac{1}{6} \times 2\frac{1}{12})$ sq. ft.;
$= 2\,(\frac{125}{9} + \frac{125}{18} + \frac{625}{72})$ sq. ft. $= \frac{2125}{36}$ sq. ft.;
$\therefore$ cost $= \frac{2125 \times 13}{72}d. = 383\frac{49}{72}d. =$ £1. 11*s.* $11\frac{49}{72}d.$

(310) 7 men and 9 women $= 7$ men and $\frac{81}{16}$ men, or, $\frac{193}{16}$ men;
now 1 man can do the work in (144×9) days;
$\therefore$ $\frac{193}{16}$ men can do the work in $\frac{144 \times 9 \times 16}{193}$ da., or, $107\frac{85}{193}$ da.

(311) Selling price of 100 is $\frac{100}{8} \times 2\frac{1}{2}d. = \frac{250}{8}d. = 31\frac{1}{4}d.$;
∴ on an outlay of 66*d.* there is a loss of $34\frac{3}{4}d.$;
on an outlay of 1*d.* there is a loss of $\frac{139}{4\times66}d.$;
on an outlay of 100*d.* there is a loss of $\frac{139\times25}{66}d.$, or, $52\frac{43}{66}d.$

(312) ·7, ·28, ·056, are in the proportion of 700, 280, 56, or, 25, 10, 2;
∴ *A* gets $\frac{25}{37}$ of £1220, or, £824. 6*s.* $5\frac{31}{37}d.$;
B gets $\frac{10}{37}$ of £1220, or, £329. 14*s.* $7\frac{5}{37}d.$;
C gets $\frac{2}{37}$ of £1220, or, £65. 18*s.* $11\frac{1}{37}d.$

(313) 1 mi. 1 fur. 7 po. = 367 po.; 41 mi. 2 fur. 12 po. = 13212 po.;
∴ time = $\frac{13212\times20}{367}$ min. = (36 × 20) min. = 12 hr.

(314) From midnight on Sunday to 4 P.M. on Wednesday are 64 hours;
∴ the clock gains $\frac{64 \times 7\frac{1}{2}}{24}$ min., or, 20 min.;
∴ it marks 4 hr. 32 min.

(315) Amount of stock = £$\frac{1000\times100}{96}$ = £$\frac{3125}{3}$
= £1041. 13*s.* 4*d.*;
annual income = £$\frac{1000\times4}{96}$ = £$\frac{1000}{24}$ = £41. 13*s.* 4*d.*

(316) $(\cdot00125 \times 2240 + \cdot0125 \times 112 + \cdot025)$ lb.
$= (2\cdot8 + 1\cdot4 + \cdot025)$ lb. $= 4\cdot225$ lb.;
$\frac{4\cdot225}{65} = \frac{\cdot845}{13} = \cdot065.$

(317) $\frac{3}{16} \times \left(1 - \frac{1350}{9990}\right) = \frac{3\times8640}{16\times9990} = \frac{54}{333} = \frac{6}{37}.$

(318) 36 cwt. 3 qr. 9 lb. = 4125 lb.; 66 cwt. = (66 × 112) lb.;
∴ cost = $\frac{50\times66\times112}{4125}s. = \frac{448}{5}s.$ = £4. 9*s.* 7·2*d.*

(319) 33 + 7 + 5 = 45;
∴ of nitre there is $\frac{33}{45}$ of 30 lb., or, 22 lb.;
of charcoal there is $\frac{7}{45}$ of 30 lb., or, $4\frac{2}{3}$ lb.;
of sulphur there is $\frac{5}{45}$ of 30 lb., or, $3\frac{1}{3}$ lb.

(320)

$$\begin{array}{l|rcrcll}
 & \pounds & & s. & & d. & \\
 & 2645 & . & 5 & \cdot & 0 & = \text{cost at } \pounds 1 \text{ each.} \\
 & & & & & 2 & \\
\hline
10s. = \frac{1}{2} \text{ of } \pounds 1. & 5290 & . & 10 & . & 0 & = \text{cost at } \pounds 2 \text{ each.} \\
2s.\,6d. = \frac{1}{4} \text{ of } 10s. & 1322 & . & 12 & . & 6 & = \ldots\ldots\ 10s. \text{ each.} \\
5d. = \frac{1}{6} \text{ of } 2s.\,6d. & 330 & . & 13 & . & 1\frac{1}{2} & = \ldots\ldots\ 2s.\,6d. \text{ each.} \\
 & 55 & . & 2 & . & 2\frac{1}{4} & = \ldots\ldots\ 5d. \text{ each.} \\
\hline
 & \pounds 6998 & . & 17 & . & 9\frac{3}{4} & = \text{cost at } \pounds 2.\,12s.\,11d. \text{ each.}
\end{array}$$

(321) Interest $= \frac{38475 \times 4\frac{3}{4} \times 3\frac{3}{19}}{100 \times 12}d. = \frac{38475 \times 19 \times 60}{100 \times 12 \times 4 \times 19}d.$

$= \frac{7695}{16}d.$;

also, since $\frac{4\frac{3}{4} \times 3\frac{3}{19}}{12} = \frac{19 \times 60}{4 \times 19 \times 12} = \frac{5}{4}$;

P. W. $= \frac{100}{100\frac{5}{4}}$ of $38475d. = \frac{400 \times 38475}{405}d. = 38000d.$;

$\therefore$ difference required $= (\frac{7695}{16} - 475)d. = 5 \cdot 9375d.$

(322)

$$\begin{array}{r|l}
 & 173889\,(\,417 \\
 & 16 \\
\hline
81 & 138 \\
 & 81 \\
\hline
827 & 5789 \\
 & 5789 \\
\hline
\end{array}$$

$\sqrt{134\frac{155}{169}} = \sqrt{\frac{22801}{169}} = \frac{151}{13} = 11\frac{8}{13}.$

(323) Area of floor $= (10\frac{2}{3} \times 7\frac{1}{3})$ sq. yd. $= \frac{32 \times 22}{9}$ sq. yd.;
length of carpet $= \frac{32 \times 22 \times 4}{9 \times 3}$ yd.;
cost of carpet $= \frac{32 \times 22 \times 4 \times 54}{27}d. = \pounds 23.\ 9s.\ 4d.$

(324) $2 + \frac{2}{5} + \frac{1}{3} + \frac{1}{6} + \frac{11}{30} = 2 + \frac{12+10+5+11}{30} = 3\frac{4}{15}$;
$\frac{4 \times 7}{5 \times 2} + \frac{4 \times 12}{13 \times 5} = \frac{4 \times 7 \times 13 \times 5}{5 \times 2 \times 4 \times 12} = \frac{91}{24} = 3\frac{19}{24}.$

(325) $\frac{\frac{3}{5} \times \frac{15}{2} \times \frac{33}{2}}{220} = \frac{9 \times 33}{4 \times 220} = \frac{27}{80}$;
$(1 \cdot 05625 \times 80)d. = 84 \cdot 5d. = 84\frac{1}{2}d.$

(326)

	£ . s. . d.
	960 . 0 . 0
	2
4*s*. is $\frac{1}{5}$ of £1	1920 . 0 . 0
4*d*. is $\frac{1}{12}$ of 4*s*.	192 . 0 . 0
$\frac{1}{2}$*d*. is $\frac{1}{8}$ of 4*d*.	16 . 0 . 0
	2 . 0 . 0
	£2130 . 0 . 0

(327)

	£ . s. . d.
	2 . 13 . 4
	3
	8 . 0 . 0
	7
2 ro. is $\frac{1}{2}$ of 1 ac.	56 . 0 . 0
1 ro. is $\frac{1}{2}$ of 2 po.	1 . 6 . 8
5 po. is $\frac{1}{8}$ of 1 ro.	13 . 4
	1 . 8
	£58 . 1 . 8

(328) $(9\frac{3}{5} \times 3\frac{3}{4}) \div 12 = \frac{48 \times 15}{5 \times 4 \times 12} = 3$;

∴ P. W. = $\frac{100}{103}$ of £$68\frac{2}{3}$ = £$\frac{100 \times 206}{103 \times 3}$ = £66. 13*s*. 4*d*.

(329) To get £5 income in the first stock I must invest

£$\frac{95 \times 5}{4\frac{3}{4}}$, or, £100;

∴ the first stock is the best to invest in;

also, 19*d*. is the income tax on £$4\frac{3}{4}$;

∴ £4. 13*s*. 5*d*. is the income from investing £95;

∴ £613. 12*s*. is the income from investing £$\frac{95 \times 147264}{1121}$,

or, £12480.

(330)

	5345344 (2312
	4
43	134 129
461	553 461
4622	9244 9244

	1·600000 (1·264...
	1
22	60 44
246	1600 1476
2524	12400 10096
	2304

(331)

(α)

	£	s.	d.
4*s.* is $\frac{1}{5}$ of £1	9836	0	0
2*s.* is $\frac{1}{2}$ of 4*s.*	1967	4	0
1*s.* is $\frac{1}{2}$ of 2*s.*	983	12	0
2*d.* is $\frac{1}{6}$ of 1*s.*	491	16	0
$\frac{1}{2}$*d.* is $\frac{1}{4}$ of 2*d.*	81	19	4
	20	9	10
	£3545	1	2

(β)

	£	s.	d.
	3	10	7
			12
	42	7	0
			10
	423	10	0
2 qr. is $\frac{1}{2}$ of 1 cwt.	24	14	1
14 lb. is $\frac{1}{4}$ of 2 qr.	1	15	$3\frac{1}{2}$
2 lb. is $\frac{1}{7}$ of 14 lb.		8	$9\frac{7}{8}$
1 lb. is $\frac{1}{2}$ of 2 lb.		1	$3\frac{1}{8}$
			$7\frac{9}{16}$
	£450	10	$1\frac{1}{16}$

(332) (1) $\dfrac{10+\frac{4}{5}-\frac{1}{2}+\frac{1}{11}}{15+\frac{1}{5}-\frac{1}{4}+\frac{7}{11}} = \dfrac{10+\frac{43}{110}}{15+\frac{129}{220}} = \frac{1143 \times 220}{3429 \times 110} = \frac{2}{3}$;

(2) $\dfrac{1 \cdot 802 \times 7 \cdot 03}{\frac{20}{9}-\frac{74}{333}} = \frac{12 \cdot 66806}{2} = 6 \cdot 33403$.

(333) Since 57 ft. ÷ $12\frac{2}{3}$ ft. = $4\frac{1}{2}$;

∴ height of tower = $(10 \times 4\frac{1}{2})$ ft. = 45 ft.

(334) Cost price = 40*d.*; selling price = 70*d.*;

∴ gain = 30*d.*; gain per cent. = $\frac{100}{40} \times 30 = 75$.

(326)	£	s.	d.
	960	0	0
			2
4*s*. is $\frac{1}{5}$ of £1	1920	0	0
4*d*. is $\frac{1}{12}$ of 4*s*.	192	0	0
$\frac{1}{2}$*d*. is $\frac{1}{8}$ of 4*d*.	16	0	0
	2	0	0
	£2130	0	0

(327)	£	s.	d.
	2	13	4
			3
	8	0	0
			7
2 ro. is $\frac{1}{2}$ of 1 ac.	56	0	0
1 ro. is $\frac{1}{2}$ of 2 po.	1	6	8
5 po. is $\frac{1}{8}$ of 1 ro.		13	4
		1	8
	£58	1	8

(328) $(9\frac{3}{5} \times 3\frac{3}{4}) \div 12 = \frac{48 \times 15}{5 \times 4 \times 12} = 3$;

∴ P. W. = $\frac{100}{103}$ of £$68\frac{2}{3}$ = £$\frac{100 \times 206}{103 \times 3}$ = £66. 13*s*. 4*d*.

(329) To get £5 income in the first stock I must invest £$\frac{95 \times 5}{4\frac{3}{4}}$, or, £100;

∴ the first stock is the best to invest in;

also, 19*d*. is the income tax on £$4\frac{3}{4}$;

∴ £4. 13*s*. 5*d*. is the income from investing £95;

∴ £613. 12*s*. is the income from investing £$\frac{95 \times 147264}{1121}$, or, £12480.

(330)

	5345344 (2312
	4
43	134
	129
461	553
	461
4622	9244
	9244

	1·600000 (1·264...
	1
22	60
	44
246	1600
	1476
2524	12400
	10096
	2304

(331)

	£	s.	d.
(*a*) 4*s*. is $\frac{1}{5}$ of £1	9836	0	0
2*s*. is $\frac{1}{2}$ of 4*s*.	1967	4	0
1*s*. is $\frac{1}{2}$ of 2*s*.	983	12	0
2*d*. is $\frac{1}{6}$ of 1*s*.	491	16	0
$\frac{1}{2}$*d*. is $\frac{1}{4}$ of 2*d*.	81	19	4
	20	9	10
	£3545	1	2

	£	s.	d.
(*β*)	3	10	7
			12
	42	7	0
			10
	423	10	0
2 qr. is $\frac{1}{2}$ of 1 cwt.	24	14	1
14 lb. is $\frac{1}{4}$ of 2 qr.	1	15	$3\frac{1}{2}$
2 lb. is $\frac{1}{7}$ of 14 lb.		8	$9\frac{7}{8}$
1 lb. is $\frac{1}{2}$ of 2 lb.		1	$3\frac{1}{8}$
			$7\frac{9}{16}$
	£450	10	$1\frac{1}{16}$

(332) (1) $\dfrac{10+\frac{4}{5}-\frac{1}{2}+\frac{1}{11}}{15+\frac{1}{5}-\frac{1}{4}+\frac{7}{11}} = \dfrac{10+\frac{43}{110}}{15+\frac{129}{220}} = \frac{1143 \times 220}{3429 \times 110} = \frac{2}{3}$;

(2) $\dfrac{1 \cdot 802 \times 7 \cdot 03}{\frac{20}{9}-\frac{74}{333}} = \frac{12 \cdot 66806}{2} = 6 \cdot 33403.$

(333) Since 57 ft. ÷ $12\frac{2}{3}$ ft. = $4\frac{1}{2}$;

∴ height of tower = (10 × $4\frac{1}{2}$) ft. = 45 ft.

(334) Cost price = 40*d.*; selling price = 70*d.*;

∴ gain = 30*d.*; gain per cent. = $\frac{100}{40} \times 30 = 75.$

(335)

```
            90306·2601 ( 300·51
            9
           -------
   6005  |  30626
         |  30025
         ----------
  60101  |    60101
         |    60101
         ----------
```

```
      2                  20|570|824 ( 274
                          8
                          —
6     7        1200      12570
                469)
               ----}     11683      ∴ cube root is 2·74.
               1669)     -----
                 49)
               ------
81    4       218700       887824
                3256
              ------
              221956       887824
                           ------
```

(336) £490 = $\frac{490 \times 20}{21}$ gui.
= $\frac{490 \times 20 \times 3}{21 \times 2}$ nap.
= $\frac{490 \times 20 \times 3 \times 15}{21 \times 2 \times 4}$ rix-dol.
= $\frac{490 \times 20 \times 3 \times 15 \times 6}{21 \times 2 \times 4 \times 7}$ duc.
= 2250 duc.

(337) The minute-hand gains 35 minute-divisions in $\frac{12 \times 35}{11}$ min.;
∴ the time will be $\frac{420}{11}$ min., or, $38\frac{2}{11}$ min. past 7.

(338) £3 income from bank stock costs $\frac{3}{10}$ of £$234\frac{1}{2}$, or, £70·35;
∴ the bank stock is the better investment.

(339) 1300005001; five thousand and thirty millions ninety thousand five hundred and one.

(340) Land-tax for 1 year = $\frac{4}{3}$ of £5. 1*s*. $7\frac{1}{2}$*d*. = £6. 15*s*. 6*d*.;
∴ net income = £240 − £6. 15*s*. 6*d*. = £233. 4*s*. 6*d*.;
and rate per pound = $\frac{1626}{240}$*d*. = $\frac{54 \cdot 2}{8}$*d*. = 6·775*d*.

(341) Interest for 1 year = £$\frac{328500 \times 5}{100}$ = £16425;
interest for 200 days = £$\frac{200 \times 16425}{365}$ = £(200 × 45)
= £9000.

(342) The gallon contains $\frac{277 \cdot 274}{1728}$ cub. ft.;
∴ the gallon weighs $\frac{277 \cdot 274 \times 1000}{1728}$ oz.;
∴ the pint weighs $\frac{277274}{1728 \times 8 \times 16}$ lb. = $\frac{277274}{221184}$ lb.
= 1·2535....lb.

(343) Area of floor = $(22\frac{1}{2} \times 20\frac{1}{4})$ sq. ft. = $\frac{45 \times 81}{8}$ sq. ft.;
∴ cost of carpet = $\frac{45 \times 81 \times 66}{9 \times 8}$*d*. = £13. 18*s*. $5\frac{1}{4}$*d*.;
area of walls = $\{ (45 + 40\frac{1}{2}) \times 10\frac{3}{4} \}$ sq. ft.
= $\frac{171 \times 43}{8}$ sq. ft.;
∴ cost of paper = $\frac{171 \times 43 \times 10}{9 \times 8}$*d*. = £4. 5*s*. $1\frac{1}{4}$*d*.

(344) *A*, and two like *B*, and *C* together do $\frac{1}{8} + \frac{1}{12}$ daily;
A and *B* and *C* together do $\frac{1}{6}$ daily;
∴ two like *A* and two like *B* and two like *C* do $\frac{1}{3}$ daily;
hence *A* and *C* do $\frac{1}{3} - (\frac{1}{8} + \frac{1}{12})$ daily, or, $\frac{3}{24}$ daily;
∴ *A* and *C* do the work in 8 days.

(345) 1 boat takes 1 herring in $\frac{8 \times 3}{6000}$ days;
∴ 600 boats take (20000 × 700) herrings in $\frac{8 \times 3 \times 20000 \times 700}{600 \times 6000}$ days, or, $93\frac{1}{3}$ days.

(346) Amount of interest = £$423\frac{1}{8}$ − £375 = £$48\frac{1}{8}$;
∴ interest on £375 for 1 year = £$(48\frac{1}{8} \div 3\frac{2}{3})$ = £$\frac{35 \times 3}{8}$;
∴ rate per cent. = $\frac{100 \times 35 \times 3}{375 \times 8}$ = $3\frac{1}{2}$.

(347) 7·75 + 92·25 = 100;
∴ value of tin = £$(\frac{775}{10000} \times \frac{35}{80} \times 140)$ = £$\frac{1519}{320}$;
and value of copper = £$(\frac{9225}{10000} \times \frac{35}{80} \times 80)$ = £$\frac{2583}{80}$;
∴ value of mass = £$\frac{11851}{320}$ = £37. 0*s*. 8*d*. nearly.

(348)

$$\begin{array}{r}
3009007 \\
5600150 \\
\hline
150450350 \\
3009007 \\
18054042 \\
15045035 \\
\hline
16850890551050
\end{array}$$

(349) Divisor + 6 times divisor + $\frac{\text{divisor}}{6}$ = 516

∴ $7\frac{1}{6}$ times divisor = 516;

∴ divisor = $\frac{516 \times 6}{43}$ = 72;

∴ quotient = 72 × 6 = 432;

and remainder = 72 ÷ 6 = 12;

∴ dividend = 432 × 72 + 12 = 31116.

(350)

$$\begin{array}{rl}
411355 \,)\, 1235192 \,(\, 3 & \\
1234065 & \\
\hline
1127 \,)\, 411355 \,(\, 365 & \\
3381 & \\
\hline
7325 & \\
6762 & \\
\hline
5635 & \\
5635 & \\
\hline
\end{array}$$

∴ H. C. F. is 1127.

$$\begin{array}{r|l}
2 & 10,\ 11,\ 12,\ 13,\ 14,\ 15 \\
\hline
3 & 5,\ 11,\ 6,\ 13,\ 7,\ 15 \\
\hline
5 & 5,\ 11,\ 2,\ 13,\ 7,\ 5 \\
\hline
 & 1,\ 11,\ 2,\ 13,\ 7,\ 1
\end{array}$$

∴ H. C. F. = 30 × 22 × 91 = 60060.

(351) £·60625 = 12·125*s.* = 12*s.* $1\frac{1}{2}$*d.*;

$\frac{142857}{999999}$ of 14*s.* $10\frac{1}{2}$*d.* = $\frac{1}{7}$ of 14*s.* $10\frac{1}{2}$*d.* = 2*s.* $1\frac{1}{2}$*d.*;

$\frac{23}{11}$ of $\frac{3}{71}$ of 781*d.* = 69*d.* = 5*s.* 9*d.*;

∴ sum of the three = £1;

also $\frac{20}{27} = \frac{2 \cdot \dot{2}}{3} = \cdot\dot{7}4\dot{0}$.

(352) 161 ÷ 7 = 23; ∴ the number is 23 × 23, or, 529.

(353) In $7\frac{1}{2}$ hr. the clock gains { ($7\frac{1}{2}$ × $3\frac{1}{2}$) ÷ 24 } min., or, $1\frac{3}{32}$ min.;

∴ it must be set at $1\frac{3}{32}$ min. to 12.

(354) 1 per cent. on £5420 gives £54·2 ;
∴ income on £9970 at the lower rate is £(453 − 54·2),
or, £398·8 ;
∴ income on £100 at the lower rate is £$\frac{398\cdot8\times100}{9970}$, or, £4 ;
hence the rates are 4 and 5.

(355) £5. 2*s.* 3*d.* is the interest on £511. 5*s.* for 3 months ;
∴ interest on £511·25 for 1 year = £20·45 ;
∴ rate per cent. = $\frac{2045\times100}{51125}$ = 4.

(356) $\frac{25}{4} \times \frac{25}{4}$ × number of heaps = 53125 ;
∴ number of heaps = $\frac{53125\times16}{25\times25}$ = 85 × 16 = 1360.

(357) 1 cow is worth £$\frac{17}{4}$;
∴ 20 horses are worth £$(20 \times \frac{5}{3} \times \frac{17}{4})$ = £141. 13*s.* 4*d.*

(358) $$\frac{40+5}{2\cdot42323\dot{2}\dot{3}+3\cdot5765\dot{7}6\dot{5}+2\cdot0\dot{0}0191\dot{1}} = \frac{8}{8} = 1.$$

(359)

	£	*s.*	*d.*	
	4 .	14 .	6	= cost of 1 cub. yd.
			9	
9 c. ft. = $\frac{1}{3}$ of 1 c. yd.	42 .	10 .	6	= cost of 9 cub. yd.
9 c. ft. = $\frac{1}{3}$ of 1 c. yd.	1 .	11 .	6	= ...... 9 cub. ft.
3 c. ft. = $\frac{1}{3}$ of 9 c. ft.	1 .	11 .	6	= ...... 9 cub. ft.
432 c. in. = $\frac{1}{12}$ of 3 c. ft.		10 .	6	= ...... 3 cub. ft.
			$10\frac{1}{2}$	= ...... 432 cub. in.
	£46 .	4 .	$10\frac{1}{2}$	= cost of 9 c. yd. 21 c. ft. 432 c. in.

(360)

```
       102·01 ( 10·1
       1
      ┌────
  201 │ 201
      │ 201
      └────
```

6·24$\dot{9}$ = 6·25 approximately ;
∴ $\sqrt{6\cdot24\dot{9}} = \sqrt{6\cdot25}$ approximately
= 2·5 approximately.

(361) Area of wall = $\{(540 + 184\frac{1}{2}) \times 8\frac{1}{3}\}$ sq. ft.
= $\frac{1449\times25}{6\times9}$ sq. yd. ;
cost of wall = $\frac{1449\times25\times6}{6\times9}$*s.* = £201. 5*s.*

(362) For each £75 invested he gets £3 income;
for each £75 invested he gets £78 money;
for each £78 invested he gets £$\frac{78\times8}{208}$ income, or, £3.

(363) L. C. M. of 2, 3, 4, 5, 6 is 60.
The lowest multiple of 60, which is a perfect square, is 900.

(364) Interest $= £\frac{2733\frac{1}{3}\times4\times3\frac{3}{4}}{100} = £\frac{82\times15}{3} = £410$;
compound interest on £100 for 3 years = £15. 15*s.* 3*d.*;
$\therefore$ sum required $= \frac{100}{115\frac{61}{80}}$ of £$926\frac{1}{10} = £\frac{100\times80\times9261}{9261\times10}$
$= £800$.

(365) Rent of 1 rood $= \frac{16\times21}{51}$*s.* $= \frac{16\times7}{17}$*s.*;
rent of 288·46875 ac. $= \frac{288\cdot46875\times16\times7\times4}{17}$*s.*
$= (16\cdot96875 \times 16 \times 28)$*s.* = 7602*s.* = £380. 2*s.*

(366) $8\cdot3 - 7 - \frac{10\times45\times6}{9\times20\times5} + \frac{5}{2} \times \frac{14}{3} = 1\frac{3}{10} - 3 + \frac{35}{3} = 9\frac{29}{30}$.

(367)

$$\begin{array}{r l}
57875 & \\
9 & \\
\hline
520875 & \times\ 90 \\
4687875 & \times\ 900 \\
42190875 & \\
\hline
42238274625 &
\end{array}
\qquad
\begin{array}{r|l}
7 & 123456 \\
\hline
9 & \ 17636 \text{ and 4 units over} \\
\hline
 & \ 1959 \text{ and 35 units over}
\end{array}$$

∴ quotient is 1959, and remainder 39.

(368)

	£	s.	d.
	7254	13	4
			2
5*s.* is $\frac{1}{4}$ of £1	14509	6	8
2*s.* is $\frac{1}{10}$ of £1	1813	13	4
1*s.* is $\frac{1}{2}$ of 2*s.*	725	9	4
3*d.* is $\frac{1}{4}$ of 1*s.*	362	14	8
$\frac{1}{2}$*d.* is $\frac{1}{6}$ of 3*d.*	90	13	8
	15	2	$3\frac{1}{3}$
	£17516	19	$11\frac{2}{3}$

$$\begin{array}{r r}
 & \text{mi.} \\
 & 3654 \\
 & 7254\frac{2}{3} \\
\hline
3 & \boxed{7308} \\
 & 2436 \\
 & 14616 \\
 & 18270 \\
 & 7308 \\
 & 25578 \\
\hline
 & \text{mi. } 26508552
\end{array}$$

(369) Area of walls $= \{ (28\frac{5}{6} + 27\frac{1}{6}) \times 12\frac{1}{4} \}$ sq. ft. $= 686$ sq. ft.;
deductions $= \{ 48 + 13 \times 2\frac{5}{12} + 20 \}$ sq. ft. $= 99\frac{5}{12}$ sq. ft.;
area of paper $= (686 - 99\frac{5}{12})$ sq. ft. $= 586\frac{7}{12}$ sq. ft.;
cost of paper $= \frac{7039 \times 7}{9 \times 12 \times 2}d. = 19s.\ 0\frac{25}{216}d.$

(370) *A*, *A*, *B* and *C* can do $\frac{1}{4} + \frac{5}{23}$ daily;
B and *C* can do $\frac{4}{23}$ daily;
∴ *A* and *A* can do $\frac{1}{4} + \frac{1}{23}$, or, $\frac{27}{92}$ daily;
∴ *A* can do the work in $6\frac{22}{27}$ days;
∴ *B* can do $\frac{1}{4} - \frac{27}{184}$, or, $\frac{19}{184}$ daily;
∴ *B* can do the work in $9\frac{13}{19}$ days;
∴ *C* can do $\frac{4}{23} - \frac{19}{184}$, or, $\frac{13}{184}$ daily;
∴ *C* can do the work in $14\frac{2}{13}$ days.

(371) *M* has 12 miles start. *N* gains 4 miles an hour on *M*, and overtakes him at the end of 3 hours, when each has gone 30 miles from *C*. *N* then gains 24 miles on *M*, and this he can do in 6 hours. Hence the distance from the place where *N* overtakes *M* to *D* is 60 miles. Hence the whole distance is 90 miles.

(372) $\frac{14}{12} \times 5 = \frac{35}{6} = 5\frac{5}{6}$;
∴ P. W. $= \frac{100}{105\frac{5}{6}}$ of £1161. 11*s.* 3*d.* = £1097. 10*s.* $9\frac{57}{127}d.$;
∴ discount = £1161. 11*s.* 3*d.* − £1097. 10*s.* $9\frac{57}{127}d.$
= £64. 0*s.* $5\frac{70}{127}d.$;
interest $= £\frac{1475 \times 5 \times 7}{100 \times 4 \times 2}$ = £64. 10*s.* $7\frac{1}{2}d.$;
∴ difference = £64. 10*s.* $7\frac{1}{2}d.$ − £64. 0*s.* $5\frac{70}{127}d.$
= 10*s.* $1\frac{241}{254}d.$

(373) The L. C. M. of 3, 2, 5 being 30, suppose the woman buys 30 apples of each sort;
she pays 10*d.* + 15*d.*, or, 25*d.*;
she gets $\frac{60 \times 2}{5}d.$, or, 24*d.*;
∴ on an outlay of 25*d.* she loses 1*d.*;
∴ on an outlay of 100*d.* she loses 4*d.*

(374)		5		198|155|287
				125
	15	8	7500	73155
			1264	
			8764	70112
			64	
	174	3	1009200	3043287
			5229	
			1014429	3043287

	tons	cwt.	qr.	lb.	
(375)	45	14	2	5	
				10	
	457	5	1	22	for 10
				10	
	4572	14	1	24	for 100
				2	
	9145	8	3	20	for 200
	228	12	2	25	for 5
	9374	1	2	17	

(376)	2	34, 51, 52, 425, 1200
	2	17, 51, 26, 425, 600
	3	17. 51, 13, 425, 300
	17	17, 17, 13, 425, 100
	25	1, 1, 13, 25, 100
		1, 1, 13, 1, 4

∴ L. C. M. is 265200.

$$\begin{array}{lrcrcrl}
 & \pounds & & s. & & d. & \\
(377) & 7865 & . & 0 & . & 0 & \\
 & & & & & 3 & \\ \cline{2-6}
6d.\text{ is }\frac{1}{40}\text{ of }\pounds 1 & 23595 & . & 0 & . & 0 & \text{at }\pounds 3\text{ each}\\
 & 196 & . & 12 & . & 6 & \text{at }6d.\text{ each}\\ \cline{2-6}
 & 23398 & . & 7 & . & 6 & \text{at }\pounds 2.\ 19s.\ 6d.\text{ each.}
\end{array}$$

(378) *C* does $\frac{1}{90}$ daily;
B does $\frac{1}{60} - \frac{1}{90}$, or, $\frac{1}{180}$ daily;
A does $\frac{1}{45} - \frac{1}{180} - \frac{1}{90}$, or, $\frac{1}{180}$ daily;
∴ the three would have done $\frac{1}{90} + \frac{1}{180} + \frac{1}{180}$, or, $\frac{4}{180}$ daily;
∴ they would have done it in 45 days.

(379) Interest for 2 months is £1;
∴ P. W. = £$\frac{100 \times 100}{101}$;
∴ discount = £$(100 - \frac{100 \times 100}{101})$ = £$\frac{100}{101}$ = 19*s*. $9\frac{63}{101}$*d*.;
again, since the discount is the interest on the P. W.,
interest on £99 is £1 for 2 months;
interest on £100 is £$\frac{100 \times 6}{99}$ for 1 year, or, £$6\frac{2}{33}$.

(380) $645 \cdot 16 + 605 \cdot 16 - 1249 \cdot 68 + \cdot 36 = 1$.

(381) $6 + 4 = 10$;
and $\frac{3}{5}$ of £31. 17*s*. 6*d*., or, £19. 2*s*. 6*d*. is one share;
∴ $\frac{2}{5}$ of £31. 17*s*. 6*d*., or, £12. 15*s*. is the other share.

(382) Cost price = $\frac{100}{93}$ of £41. 17*s*., or, £45.

(383) 1 centimètre = ·010936 yd.;
= (·010936 × 36) in. = ·393696 in.
= ·3937 in. nearly.

$$(384)\qquad \begin{array}{r}
6 \cdot 2777777\dot{7}\\
18 \cdot 65165\dot{1}6\dot{5}\\
12 \cdot 345454\dot{5}\dot{4}\\ \hline
37 \cdot 2\dot{7}48839\dot{7}
\end{array}\qquad\qquad
\begin{array}{r}
\cdot 3402\dot{7}\\
\cdot 2777\dot{7}\\ \hline
\cdot 0625
\end{array}$$

(385) $407\frac{7}{8} \times 80$*d.* = 32630*d.* = £135. 19*s.* 2*d.*

(386) Cost price = $\frac{100}{91}$ of £182 = £200;
selling price should have been $\frac{107}{100}$ of £200, or, £214.

(387) Content of two longer sides = $(2 \times 4 \times 2 \times \frac{1}{12})$ c. ft.
= $\frac{4}{3}$ c. ft.;
content of two shorter sides = $(2 \times 2\frac{5}{6} \times 2 \times \frac{1}{12})$ c. ft.
= $\frac{17}{18}$ c. ft.;
content of bottom = $(3\frac{5}{6} \times 2\frac{5}{6} \times \frac{1}{12})$ c. ft. = $\frac{391}{432}$ c. ft.;
∴ whole content = $\frac{576+408+391}{432}$ c. ft. = $\frac{1375}{432}$ c. ft.;
∴ cost = $\frac{12}{11}$ of $\frac{1375 \times 9}{432 \times 27}$*s.* = $\frac{125}{108}$*s.* = 1*s.* $1\frac{8}{9}$*d.*

(388) Weekly receipts = £3135. 12*s.* + £261. 6*s.*
= £3396. 18*s.*;
∴ weekly gain = £3396. 18*s.* − £1396. 19*s.*
= £1999. 19*s.*;
∴ gain for 364 days = £2000 × 52 − 52*s.* = £103997. 8*s.*;
and, if the 365th day be a week-day, gain for the year
= £104520;
∴ reserve = £104520 − £100000 = £4520.

```
(389)           8                    674|526|133
                                     512
                                     ───
         24     7       19200        162526
                         1729 ⎫
                        ───── ⎬      146503
                        20929 ⎪      ──────
                           49 ⎭
                        ───────
        261     7     2270700         16023133
                        18319
                      ───────
                      2289019         16023133
                                      ────────
```

(390) First interest = £$\frac{625 \times 2 \times 9}{100 \times 3 \times 2}$ = £$\frac{25 \times 3}{4}$ = £18. 15*s.*;
second interest = £$\frac{1875 \times 1 \times 3}{100 \times 3}$ = £18·75 = £18. 15*s.*

(391) $\frac{17}{24} = \frac{17 \times 7 \times 73}{24 \times 7 \times 73}$ $= \frac{8687}{24 \times 7 \times 73}$, the least;
$\frac{35}{49} = \frac{5}{7} = \frac{5 \times 24 \times 73}{24 \times 7 \times 73} = \frac{8760}{24 \times 7 \times 73}$, the greatest;
$\frac{52}{73} = \frac{52 \times 24 \times 7}{24 \times 7 \times 73} = \frac{8736}{24 \times 7 \times 73}$.

(392) 30 per cent. on 57*d.* = $\frac{171}{10}$*d.* = 17·1*d.*;
∴ retail price = (57 + 17·1)*d.* = 6*s.* 2$\frac{1}{10}$*d.*

(393) $\frac{27 \cdot 72}{8 \cdot 1} = \frac{277 \cdot 2}{81} = \frac{30 \cdot 8}{9} = 3 \cdot 4\dot{2}$;
$\frac{27 \cdot 72}{\cdot 081} = \frac{27720}{81} = \frac{3080}{9} = 342 \cdot \dot{2}$.

(394) $\frac{340}{12000} = \frac{\cdot 34}{12} = \frac{\cdot 17}{6} = \cdot 028\dot{3}$.

(395) P. W. = $\frac{100}{101 \cdot 5}$ of £1031·85 = £$\frac{206370}{203}$
= £1016. 12*s.* 0$\frac{48}{203}$*d.*

(396) Here we have to find the L. C. M. of 1, 2, 3, 4, 5, 6, 7, 8, which is the same as the L. C. M. of 5, 6, 7, 8, that is, 840;
hence the bells will be tolling together in 840 sec., or, 14 min.

(397) Volume left = ($6\frac{1}{4} \times 4\frac{5}{12} \times 4\frac{1}{6}$) c. ft. = 115 c. ft. 30 c. in.

(398) 22 men dig (420 × 5 × 3) cub. yd. in (350 × 9) hr.;
∴ 1 man digs 1 cub. yd. in $\frac{350 \times 9 \times 22}{420 \times 5 \times 3}$ hr., or, 11 hours;
∴ 252 men dig (210 × 3 × 2) cub. yd. in $\frac{210 \times 3 \times 2 \times 11}{252}$ hr., or, 55 hours;
∴ they will take 5 days.

(399) Interest for 4th year = £926·1 × $\frac{5}{100}$ = £46·305;
interest for 5th year = £972·405 × $\frac{5}{100}$
= £48·62025;
∴ amount = £1021·02525 = £1021. 0*s.* 6·06*d.*

(400) 30 men and 10 boys can reap 130 acres in 4 days;
14 men and 10 boys can reap 66 acres in 4 days;
∴ 16 men can reap 64 acres in 4 days;
∴ 1 man can reap 1 acre in 1 day;
∴ 2 boys can reap 1 acre in 2 days;
∴ 1 boy can reap $\frac{1}{4}$ acre in 1 day;
hence in 1 day 2 men and 2 boys can reap $2\frac{1}{2}$ acres;
∴ in 4 days they will reap 10 acres.

(401)

```
          £      s.   d.
127 ) 7817 . 12 . 10½ ( £61
      762
      ———
       197
       127
       ———
        70
        20
      ————
      1412 ( 11s.
      1397
      ————
        15
        12
      ————
       190 ( 1d.
       127
       ———
        63
         4
       ———
       254 ( 2q.
       254
       ———
```

(402)

$4s.\ 11\frac{3}{4}d. = 239q.$
$4s.\ 10\frac{1}{2}d. = 234q.$
∴ number of ducats $= \frac{55926 \times 234}{239}$
$= 234 \times 234 = 54756.$

(403)

$\frac{2\times3\times2}{3\times4}s. + \frac{4\times7\times5}{5\times8}s. = 4s.\ 6d.$;
$\frac{4\cdot5}{20} = \frac{\cdot45}{2} = \cdot225.$

(404)

```
          9·86260440 ( 3·1404...
          9
         ————
   61   | 86
        | 61
        |————
  624   | 2526
        | 2496
        |——————————
62804   |   300440
        |   251216
        |——————————
```

(405) 1 pint of water weighs $\frac{146\cdot17}{8}$ oz. troy,

or, $\frac{146\cdot17}{8\times12}$ lb. troy, or, $\frac{146\cdot17\times5760}{8\times12\times7000}$ lb. avoirdupois;

hence 1 cub. in. of water weighs $\frac{146\cdot17\times5760}{8\times12\times7000\times34\cdot66}$ lb. avoirdupois;

∴ 1 cub. ft. of water weighs $\frac{146\cdot17\times5760\times1728}{8\times12\times7000\times34\cdot66}$ lb. avoirdupois,

or, $\frac{14617\times72\times144}{700\times3466}$ lb. avoirdupois,

or, $\frac{14617\times36\times72\times16}{350\times1733}$ oz. avoirdupois,

or, $\frac{606196224}{606550}$ oz. avoirdupois, or, 999·4....oz. avoirdupois.

(406) Area of each grass plot = (66 × 36) sq. ft.;

∴ area covered by grass = $\frac{66\times36\times4}{9}$ sq. yd. = 1056 sq. yd.;

area of whole court = (50 × 30) sq. yd. = 1500 sq. yd.;

∴ cost of grass = £$\frac{1056\times3}{20}$ = £158. 8*s.*;

cost of stones = £$\frac{444\times9\times20}{12\times20}$ = £333;

∴ whole cost = £491. 8*s.*

(407) 6 minutes will be the difference between the clocks at the end of 12 hours; and ∴ $16\frac{1}{2}$ min. will be the difference at the end of $\frac{16\frac{1}{2}\times12}{6}$ hr., or, 33 hr.

Hence the true time will be 9 o'clock on Tuesday evening, by which time the fast goer will have gained (4 + 4 + 3) min., or, 11 min., and the slow goer will have lost (2 + 2 + $1\frac{1}{2}$) min., or, 5 min. 30 sec.;

∴ the times marked will be 9 hr. 11 min. and 8 hr. 54 min. 30 sec.

(408) Call a coin of each respectively C_1 and C_2;

then $\frac{1}{12}$ of C_1 is silver and $\frac{11}{12}$ of C_1 is gold;

and $\frac{23}{24}$ of C_2 is gold;

then, since $\frac{1}{16}$ of $\frac{1}{12} = \frac{1}{192}$;

$$\text{value of } C_1 : \text{value of } C_2 = 46 \times \left(\tfrac{11}{12}+\tfrac{1}{192}\right) : 88\tfrac{1}{2}\times\tfrac{23}{24};$$

$$= \tfrac{46\times177}{192} : \tfrac{177\times23}{48};$$

$$= \tfrac{2}{4} : 1 = 2 : 4 = 1 : 2.$$

(409) P. W. $= \frac{100}{101\frac{1}{2}}$ of £$690\cdot2 =$ £$\frac{100\times2\times690\cdot2}{203} =$ £680;

∴ discount = £690. 4*s.* − £680 = £10. 4*s.*

(410) M. P. $= \sqrt{\{\cdot6 \times \cdot024\}} = \sqrt{\cdot0144} = \cdot12.$

(411) $\frac{6s.\ 4d.\ 3\frac{2}{9}q.}{7} = 10d.\ 3\frac{8}{9}q.$;

$\frac{2\times37}{3\times24}d. = \frac{37\times4}{3\times12}q. = \frac{37}{9}q. = 4\frac{1}{9}q.$;

∴ $10d.\ 3\frac{8}{9}q. + 4\frac{1}{9}q. = 1s.$

(412) $\frac{\cdot00108}{270} = \frac{\cdot000108}{27} = \cdot000004$;

$\frac{62500}{\cdot25} = \frac{6250000}{25} = 250000$;

$\frac{2\cdot64}{\cdot32} = \frac{264}{32} = \frac{66}{8} = 8\cdot25.$

(413) On £80 he gets £6 annually;

∴ on £100 he gets £$\frac{6\times100}{80}$, or, £$\frac{60}{8}$, or, £$7\frac{1}{2}$;

amount of Turkish stock = £$\frac{5000\times100}{80}$;

money from sale of stock = £$\frac{5000\times100\times104}{80\times100}$ = £6500;

also since £90 invested in railway shares gives an income of £$4\frac{1}{2}$,

new income = £$\frac{6500\times4\frac{1}{2}}{90}$ = £325;

but first income = £$\frac{5000\times6}{80}$ = £375;

∴ he has £50 less income.

(414) For £1 I can buy $\frac{155}{178\cdot25}$ yd.;

∴ for £74·875 I can buy $\frac{155\times74875}{178250}$ yd., or, 65·108...yd.

(415) $\frac{\frac{7}{4}-\frac{3}{4}}{\frac{1}{2}+5\frac{1}{2}} \div \frac{1}{6} - \{\frac{10}{21} + \frac{4}{21} - \frac{10}{63}\} \div \frac{4}{7}$

$= \frac{1}{6} \div \frac{1}{6} - \frac{32}{63} \times \frac{7}{4} = 1 - \frac{8}{9} = \frac{1}{9}.$

(416) 1 man can do the work in (14 × 6 × 8 × 20) hr.;

24 men can do the work in $\frac{14\times6\times8\times20}{24}$ hr., or, (14 × 2 × 20) hr.;

∴ number of weeks $= \frac{14\times2\times20}{5\times7} = 16.$

(417) The rates of the trains are as 6 : 7, because the quick train goes as far in 6 hours as the slow train goes in 7 hours.

Also the quick train gains 5 miles an hour on the slow train, because it would take 2 hours to gain the 10 miles.

Hence the rates are 30 miles and 35 miles an hour.

(418) Area of walls $= \{(40\frac{3}{4}+22\frac{1}{4}) \times 12\frac{1}{2}\}$ sq. ft. $= \frac{63 \times 25}{2}$ sq. ft.;
length of paper $= (\frac{63 \times 25}{2 \times 9} \times \frac{8}{5})$ yd. $= 140$ yd.;
cost of paper $= \frac{140 \times 9}{4}$*d.* = £1. 6*s.* 3*d.*

(419) 2 per cent. on *A*'s capital is £220;
∴ *A*'s capital is £$\frac{220 \times 100}{2}$ = £11000;
∴ *B* and *C*'s capital = $\frac{3}{2}$ of £11000 = £16500;
∴ capital of each is £8250.

(420)		5		159837789483
				125
	15	4	7500	34837
			616	
			8116	32464
			16	
	162	2	874800	2373789
			3244	
			878044	1756088
			4	
	1626	7	88129200	617701483
			113869	
			88243069	617701483

(421) He sells $\frac{2 \times 160}{3}$ lb. for $\frac{320 \times 8}{3}$*d.*, or, $853\frac{1}{3}$*d.*;
he has to sell $\frac{160}{3}$ lb. for £$6\frac{1}{4}$ − $853\frac{1}{3}$*d.*, or, $646\frac{2}{3}$*d.*;
∴ price per lb. $= (\frac{1940}{3} \div \frac{160}{3})$*d.* $= 12\frac{1}{8}$*d.*

(422) $\frac{3\cdot5}{15\times20\times4} = \frac{\cdot7}{240} = \frac{\cdot07}{24} = \frac{\cdot0175}{6} = \cdot00291\dot{6}$;
$\frac{12600}{99900}$ of $111d. = \frac{126}{9}d. = 1s.\ 2d.$

(423) $\frac{5}{8}$ of the debt is £25 ; ∴ the debt is £$\frac{25\times8}{5}$, or, £40.

(424) The shares are in the ratio $4 \times 10 \times 1 : 12 \times 3 \times 2 : 20 \times 3 \times 1$, or, $40 : 72 : 60$;
∴ *A*'s share = $\frac{40}{172}$ of £43 = £10 ;
B's share = $\frac{72}{172}$ of £43 = £18 ;
C's share = $\frac{60}{172}$ of £43 = £15.

(425) The cubic content of a brick in the second case is $(\frac{4}{5})^3$ of that of a brick in the first case. Hence we may leave the exact dimensions of the first bricks out of account, and reason thus :
cost of the 100 bricks = $100 \times \frac{64}{125} \times \frac{12200}{9760}d. = 64d.$
$= 5s.\ 4d.$

(426) Number of years = $\frac{100}{3\frac{1}{3}} = \frac{100\times3}{10} = 30$.

(427) Cash to be realised = £10000;
∴ stock to be sold = £$\frac{100\times10000}{90}$ = £$\frac{100000}{9}$ = £$11111\frac{1}{9}$.

(428) At 11 o'clock the hands are 5 minute-spaces apart, and at particular positions of the minute-hand between 11 and 12 the integral number of minute-spaces, reckoned from left to right, between the hands will be successively 6, 7......59, or, in all 54.

(429) *A* walks 20 mi. in 220 min. ;
∴ *B* walks 20 mi. in 265 min. ;
∴ *B*'s rate is $\frac{265}{20}$ min., or, $13\frac{1}{4}$ min. per mile.
Again, *A* walks 5 mi. in 55 min. ;
B walks 5 mi. in $66\frac{1}{4}$ min. ;
∴ *A* wins by $11\frac{1}{4}$ min., and by $(11\frac{1}{4} \div 13\frac{1}{4})$ mi., or, $\frac{45}{53}$ mi.

(430) $\frac{1}{4} \times 3 + \frac{1}{2} \times$ (number of months when the remainder should be paid) $= 4\frac{1}{2}$;

$\therefore$ $\frac{1}{2} \times$ (number of months required) $= 4\frac{1}{2} - \frac{3}{4} = \frac{15}{4}$;

$\therefore$ number of months $= \frac{30}{4} = 7\frac{1}{2}$.

(431) In 400 consecutive years there are 100 − 3, or, 97 leap years;

$\therefore$ number of times $= 400 \times 11 + 97 = 4497$.

(432) The parts are as 6, 4, 3, 2; and the sum of these is 15; also $\frac{1}{15}$ of £16. 17*s.* 6*d.* = £1. 2*s.* 6*d.*;

$\therefore$ the parts are £6. 15*s.*; £4. 10*s.*; £3. 7*s.* 6*d.*; £2. 5*s.*

(433) 2 mi. 5 fur. 9 po. 1 ft. 6 in. = 4670 yd.;

$\therefore$ fraction $= \frac{5}{11}$ of $\frac{7 \times 40 \times 5\frac{1}{2}}{4670} = \frac{5 \times 7 \times 40 \times 11}{11 \times 4670 \times 2} = \frac{70}{467}$.

(434) $10\cdot375 \times \cdot0074 = \cdot076775$;

$1\cdot\dot{2}\dot{7} \times \cdot0458 = \frac{126}{99} \times \frac{458}{10000} = \frac{1603}{11 \times 2500} = \cdot0582\dot{9}\dot{0}$;

$\frac{1080}{\cdot008} = \frac{1080000}{8} = 135000$;

$\frac{123000}{99900} \div \frac{360}{99} = \frac{123 \times 99}{999 \times 36} = \frac{451}{1332} = \cdot33\dot{8}5\dot{8}$.

(435) In 60 minutes the second wheel revolves $60 \times \frac{360}{100} \times 20$, or, 4320 times;

also, thread wound $= \frac{4320 \times 5 \times 11}{1760 \times 3}$ mi. = 45 mi.

(436) He bought at $\frac{100}{110}$ of 99, or, 90;

his income was $\frac{3}{99}$ of £15345, or, £465.

(437) Cubic content of tank $= (8 \times 5\frac{1}{3} \times 4\frac{1}{2})$ cub. ft.
$= 192$ cub. ft.;

weight of water in tank $= \frac{192 \times 1000}{16}$ lb., or, 12000 lb.;

quantity of water in tank $= \frac{4 \times 12000}{5 \times 8}$ gall. = 1200 gall.

Next, net efflux per minute $= (7 - 4\frac{1}{2})$ gall., or, $2\frac{1}{2}$ gall.;

$\therefore$ time in which 300 gall. flow out $= (300 \div 2\frac{1}{2})$ min.
$= 120$ min. = 2 hr.

(438) His gain is $\frac{931}{49}$ quarters, or 19 quarters ;
and since on each qr. he gains $\frac{1}{9}$ qr. from one tenant,
and $\frac{1}{10}$ qr. from the landlord,
∴ rent is $19 \div (\frac{1}{9} + \frac{1}{10})$ qr., or 90 qr.

(439) First, when the minute hand is between 2 and 3 ;
number of minutes past 3 + $\frac{1}{12}$ (number of minutes past 3) = 15 ;
∴ $\frac{13}{12}$ of number of minutes past 3 = 15 ;
∴ number of minutes past 3 = $\frac{12 \times 15}{13} = 13\frac{11}{13}$.
Secondly, when the hands are together between 3 and 4,
number of minutes past 3 − $\frac{1}{12}$ (number of minutes past 3) = 15 ;
∴ $\frac{11}{12}$ of number of minutes past 3 = 15 ;
∴ number of minutes past 3 = $\frac{12 \times 15}{11} = 16\frac{4}{11}$.

(440) Cubic content of water = $(12\frac{2}{3} \times 12\frac{2}{3} \times 3\frac{3}{4})$ cub. ft.
$= \frac{19 \times 19 \times 5}{3}$ cub. ft. ;
wt. of water = $\frac{1805000}{3}$ oz. = 16 tons 15 cwt. 3 qr. $2\frac{2}{3}$ oz.

(441) Number of years = $100 \div 2\frac{1}{2} = \frac{200}{5} = 40$.

(442) 3 men can reap 20 ac. in 121 hr. ;
1 man can reap 1 ac. in $\frac{121 \times 3}{20}$ hr. ;
9 men can reap $\frac{360 \times 320}{4840}$ ac. in $\frac{121 \times 3 \times 360 \times 320}{9 \times 20 \times 4840}$ hr. ;
∴ they take 48 hours, and they have to work 4 days.

(443) Cubic content of water drawn from upper canal
$= (118 \times 660 \times 48 \times \frac{1}{12})$ cub. ft. ;
cubic content of water in the lock = $(80 \times 12 \times \frac{17}{2})$ cub. ft. ;
∴ number of barges = $\frac{118 \times 660 \times 4}{80 \times 6 \times 17} = \frac{649}{17} = 38\frac{3}{17}$;
∴ 38 barges can pass through.

(444) $$\frac{1}{\frac{29 \times 36}{4 \times 11} + \frac{26}{11}} \div \left(\frac{27-26}{117}\right) - \frac{27}{6} \div \frac{2 \times 3 \times 63}{3 \times 8}$$
$$= \frac{11}{297} \times \frac{117}{1} - \frac{27 \times 4}{6 \times 63} = \frac{117}{27} - \frac{2}{7} = 4\frac{1}{21}.$$

(445) $\frac{81}{99}$ of £$14\frac{2}{3}$ = £$\frac{9\times44}{11\times3}$ = £12 ;
$\frac{8181}{10000}$ of £$14\frac{2}{3}$ = £$\frac{8181\times44}{10000\times3}$ = £11·9988
= £11. 19*s.* 11·712*d.* ;
fraction = $\frac{12-11\cdot9988}{12}$ = $\frac{\cdot00012}{12}$ = ·0001 = $\frac{1}{10000}$.

(446) P. W. = $\frac{100}{108}$ of £2358 = £$2183\frac{1}{3}$;
∴ income from gas shares = $\frac{9}{144}$ of £$2183\frac{1}{3}$
= £136. 9*s.* 2*d.* ;
rate per cent. = $\dfrac{136\frac{11}{24}}{2183\frac{1}{3}}$ of 100 = $\frac{3275\times100}{6550\times8}$ = $6\frac{1}{4}$.

(447) *A* can make 50 when *B* makes 45 ;
A can make 50 when *C* makes 40 ;
∴ *B* can make 90 when *C* makes 80 ;
∴ *B* can give *C* 10 points in 90.

(448) $\frac{11}{23}+\frac{2}{3}$ of $\frac{12}{23}=\frac{11}{23}+\frac{8}{23}=\frac{19}{23}$;
hence $\frac{4}{23}$ of the boys = 8 ;
∴ number of boys = $\frac{23\times8}{4}$ = 46.

(449)

$$
\begin{array}{r|l}
 & 5290455\cdot409801\ (\,2300\cdot099 \\
 & 4 \\
\hline
43 & 129 \\
 & 129 \\
\hline
460009 & \quad 4554098 \\
 & \quad 4140081 \\
\hline
4600189 & \quad 41401701 \\
 & \quad 41401701 \\
\hline
\end{array}
$$

(450) Interest for 5 years on £1250 = £$281\frac{1}{4}$ = £$\frac{1125}{4}$:
interest for 1 year on £1250 = £$\frac{225}{4}$;
interest for 1 year on £100 = £$(\frac{225}{4}\div12\frac{1}{2})$ = £$\frac{9}{2}$
= £$4\frac{1}{2}$.

'451) £11. 18*s.* $7\frac{1}{2}$*d.* = 5487 half-pence ;
£502. 19*s.* 6*d.* = 241428 half-pence ;
∴ number of times = $\frac{241428}{5487}$ = 44.

(452) $\frac{1}{3}[3 + \frac{1}{4}\{3 + \frac{1}{3} \text{ of } \frac{9}{2}\}] + \frac{125}{1000}$
$= \frac{1}{3}[3 + \frac{1}{3} \text{ of } \frac{9}{2}] + \frac{1}{8} = (\frac{1}{3} \text{ of } \frac{9}{2}) \times 8 = 12.$

(453)

$$\begin{array}{r} 79\cdot347 \\ 23\cdot15 \\ \hline 396735 \\ 79347 \\ 238041 \\ 158694 \\ \hline 1836\cdot88305 \end{array}$$

$$\begin{array}{l} 464)\ 178\cdot986144\ (\cdot385746 \\ 1392 \\ \overline{3978} \\ 3712 \\ \overline{2666} \\ 2320 \\ \overline{3461} \\ 3248 \\ \overline{2134} \\ 1856 \\ \overline{2784} \\ 2784 \end{array}$$

(454)

$$\begin{array}{r|l} 12 & 3\cdot25 \\ \hline 3 & 15\cdot2708\dot{3} \\ \hline 7 & 5\cdot0902\dot{7} \\ \hline & \cdot727\dot{1}82539\dot{6} \end{array}$$

$\cdot0\dot{9}$ of £5 $=$ £$\frac{9 \times 5}{90} = 10s.$

(455) $\frac{5}{6}$ of the remainder after the battle was 60000;
∴ the remainder was $\frac{60000 \times 6}{5}$, or, 72000;
∴ whole army was 72000 + 12000, or, 84000.

(456) £90 invested will produce an income of £3;
∴ sum to be invested $= \frac{90}{3}$ of £2000 = £60000.

(457) In 40 feet the fore wheel revolves 5 times, and the hind wheel 4 times; hence the fore wheel makes 1 more revolution than the hind wheel in 40 feet;
∴ distance required is (40 × 100) ft., or, 4000 ft.

(458) Five gallons of brandy are worth 150*s.*;
five gallons of brandy and one gallon of water are worth 150*s.*, which is at the rate of 25*s.* per gall. for the mixture;
hence 100 gallons of brandy and 20 gallons of water will make a mixture worth 25*s.* a gallon.

(459) The quick train runs 5 miles while the slow train runs 3 miles;

∴ distance run by slow train = $\frac{3}{5}$ of distance run by quick train:

∴ distance run by quick train = $\frac{5}{3}$ of distance run by quick train + 100 miles;

∴ $\frac{2}{3}$ of distance run by quick train = 100 miles;

∴ quick train has run $\frac{5 \times 100}{2}$ miles, or, 250 miles;

and slow train has run $\frac{3}{5}$ of 250 miles, or, 150 miles;

∴ the distance is 400 miles.

(460) In first stock I have to pay £$92\frac{5}{8}$ for £$3\frac{1}{4}$ income;

∴ for £$3\frac{1}{2}$ income I have to pay £$\frac{92\frac{5}{8} \times 3\frac{1}{2}}{3\frac{1}{4}}$, or, £$99\frac{3}{4}$;

∴ the first stock is the better investment.

(461) $\frac{1}{4} + \frac{1}{5} + \frac{1}{6} = \frac{15+12+10}{60} = \frac{37}{60}$;

∴ $\frac{23}{60}$ of the number = 161;

∴ the number = $\frac{161 \times 60}{23}$ = 420.

(462) $\dfrac{\frac{22}{7}}{\frac{39}{5} \times \frac{3}{4}} \times \dfrac{\frac{13}{28}}{\frac{45}{56}}$ of £9 = $\frac{22 \times 5 \times 4 \times 13 \times 56}{39 \times 3 \times 7 \times 28 \times 45}$ of £9

= £$\frac{22 \times 8 \times 9}{3 \times 3 \times 7 \times 9}$ = £$\frac{176}{63}$ = £2. 15*s.* $10\frac{10}{21}$*d.*

(463)

```
273) 1719·9 (6·3                 6·3000 (2·50...
     1638                        4
     ————                       ———
      819                  45 | 230
      819                     | 225
      ———                     ————
                          500 |  500
```

(464) Number of cub. ft. = $56\frac{2}{3} \times 19\frac{1}{2} \times 2\frac{1}{2} = \frac{170 \times 39 \times 5}{3 \times 2 \times 2}$

= $2762\frac{1}{2}$.

(465) Price required = $\frac{3\frac{1}{2}}{3} \times 75 = \frac{7 \times 75}{2 \times 3} = 87\frac{1}{2}$.

(466) The L. C. M. of 2, 3, and 5 is 30, and 90 ÷ 30 = 3;
∵ he sees them 3 times, or 4 times if we reckon the starting point.

(467) Area of walls = (36 × 2 × 14) sq. ft. = 1008 sq. ft.;
deductions = (2 × 8 × 4 + 3 × 10 × 5) sq. ft.
= 214 sq. ft.;
∴ area to be painted = 794 sq. ft.
Now 50 sq. ft. cost £2. 16*s.* 3*d.*, and ∴ 1 sq. ft. costs $13\frac{1}{2}$*d.*;
∴ cost of painting = $\frac{794 \times 27}{2}$*d.* = £44. 13*s.* 3*d.*
Again for 9*s.* we can paint 8 square feet;
∴ additional height = (8 ÷ 72) ft. = $\frac{1}{9}$ ft.

(468) In 10 days *A* does $\frac{10}{6}$ of the work;
in 5 days *B* destroys $\frac{5}{4}$ of the work;
∴ $\frac{10}{6} - \frac{5}{4}$, or, $\frac{5}{12}$ of the work is done;
∴ $\frac{7}{12}$ of the work remains to be done;
and as *A* can do $\frac{1}{12}$ in half a day, he must work $3\frac{1}{2}$ days to complete the work.

(469) 7 men working $(\frac{53}{5} \times \frac{21}{4})$ hours can earn £4. 15*s.* 3*d.*;
1 man working 1 hour can earn $\frac{5 \times 4}{7 \times 53 \times 21}$ of £4. 15*s.* 3*d.*;
28 men working $\frac{63 \times 53}{4 \times 10}$ hours can earn $\frac{28 \times 63 \times 53 \times 5 \times 4}{4 \times 10 \times 7 \times 53 \times 21}$ of £4. 15*s.* 3*d.*;
∴ they earn 6 times £4. 15*s.* 3*d.*, or, £28. 11*s.* 6*d.*

(470)		6		273359449
				216
	18	4	10800	57359
			736	
			11536	46144
			16	
	192	9	1228800	11215449
			17361	11215449
			1246161	

(471) $\frac{9}{10}$ of $\frac{15}{4} - \frac{3}{7}$ of $\frac{5}{8} = \frac{27}{8} - \frac{15}{56} = \frac{174}{56} = 3\frac{3}{28}$.

(472)
$$\left.\begin{array}{l}\frac{\cdot 14}{7} = \cdot 02 \\ \frac{140}{\cdot 07} = \frac{14000}{7} = 2000 \\ \frac{\cdot 014}{7000} = \cdot 000002\end{array}\right\}\begin{array}{l}\therefore \text{ sum of results} = 2000\cdot 020002 \\ \quad = \frac{2000020002}{1000000} = \frac{1000010001}{500000}.\end{array}$$

(473) He sells half a ton for (10 × 112 × $\frac{29}{4}$)*d.*, or, 8120*d.*
∴ he gains £33. 16*s.* 8*d.* – £29. 10*s.*, or, £4. 6*s.* 8*d.*

(474)
$$\left.\begin{array}{l}\text{Value of stock} = \pounds(8\cdot 5 \times 93) \\ \quad = \pounds 790.\ 10s. \\ \text{P. W.} = \dfrac{100}{103\frac{1}{2}} \text{ of } \pounds 817.\ 13s. \\ \quad = \pounds 790.\end{array}\right\}\begin{array}{l}\therefore \text{ the stock is more} \\ \quad \text{valuable.}\end{array}$$

Income from stock = $\pounds\frac{850\times 3}{100}$ = £25. 10*s.*;
interest from money = $\pounds\frac{790\times 3\cdot 5}{100}$ = £27. 13*s.*

(475) *A* does $\frac{1}{6}$ of the work in 1 hr.;
B does $\frac{1}{12}$ of the work in 1 hr.;
A, *B*, and *C* do $\frac{1}{2\frac{1}{2}}$, or, $\frac{2}{5}$ of the work in 1 hour;
∴ *C* does in 1 hour $(\frac{2}{5} - \frac{1}{6} - \frac{1}{12})$, or, $\frac{3}{20}$;
∴ in 5 hours *C* does $\frac{3}{4}$ of the work;
and in 9 hours *B* does $\frac{9}{12}$, or, $\frac{3}{4}$ of the work.

(476) For £1 I get 672 kreutzers;
for £1 I get $\frac{25\cdot 5}{20}$ × 560 kreutzers, or, 714 kreutzers;
∴ on 672 kreutzers I gain 42 kreutzers;
∴ on 100 kreutzers I gain $\frac{42\times 100}{672}$ kr., or, $6\frac{1}{4}$ kr.

(477) 133 + 212 + 325 = 670;
∴ first creditor receives $\frac{133}{670}$ of £201, or, $\pounds\frac{133\times 3}{10}$, or, £39. 18*s.*
second creditor receives $\frac{212}{670}$ of £201, or, $\pounds\frac{212\times 3}{10}$, or, £63. 12*s.*
third creditor receives $\frac{325}{670}$ of £201, or, $\pounds\frac{325\times 3}{10}$, or, £97. 10*s.*

(478) 1 woman = $\frac{3}{4}$ of a man; 1 boy = $\frac{3}{5}$ of a man;
1 girl = $\frac{1}{2}$ of a man;
∴ 1 man + 2 women + 3 boys + 4 girls
$= (1 + \frac{3}{2} + \frac{9}{5} + 2)$ men $= \frac{63}{10}$ men.
Since then 3 men can do the work in 60 days;
1 man can do the work in 180 days;
$\frac{63}{10}$ men can do the work in $\frac{1800}{63}$ days, or, $28\frac{4}{7}$ days.

(479) Area of horizontal section of each pier $= (3\cdot14159 \times \frac{225}{4})$ sq. ft.;
∴ pressure $= (750 \times 144 \times 3\cdot14159 \times \frac{225}{4})$ tons
$= 19085159\cdot25$ tons.

(480) $69\frac{1}{2}$ miles $= (69\frac{1}{2} \times 1760)$ yds. $= (\frac{139 \times 880 \times 32}{35})$ mètres
$= 111835\frac{3}{7}$ mètres.

(481) $\frac{5}{3}$ of the sum = 30*d.*; ∴ the sum $= \frac{3 \times 30}{5}$*d.*, or. 1*s.* 6*d.*

(482) $\frac{5714280}{9999990} \times \frac{63}{99} = \frac{63492}{111111} \times \frac{7}{11} = \frac{5772}{15873} = \cdot\dot{3}\dot{6}$.

(483)
$$
\begin{array}{l}
\cdot0438\,)\,41\cdot06328\,(\,937 \\
\underline{3942} \\
\;\;1643 \\
\;\;\underline{1314} \\
\;\;\;3292 \\
\;\;\;\underline{3066} \\
\;\;\;\;2268
\end{array}
$$
∴ remainder is ·02268 of an inch.

(484) The cube root of 50·653 is 3·7;
hence length of external edge $= 3\cdot7$ ft. $+ 1\cdot\dot{3}$ in. $+ 1\cdot\dot{3}$ in.
$= (44\cdot4 + 2\cdot\dot{6})$ in. $= 47\cdot0\dot{6}$ in. $= 3$ ft. $11\frac{1}{15}$ in.

(485) For £$91\frac{1}{8}$ he gets an income of £2. 18*s.* 9*d.*, or, 705*d.*;
∴ for £8063 he has an income of $\frac{8063 \times 705 \times 8}{729}$*d.*
= £259. 18*s.* $4\frac{100}{243}$*d.*

(486) £16. 15*s.* 3*d.* = 4023*d.*; and 2*s.* 3*d.* = 27*d.*;
∴ number of square feet of wainscot = 4023 ÷ 27 = 149;
∴ number of feet in circuit of room = $\frac{149}{2}$.
Now 62 + 87 = 149, and hence we find
length of room = $\frac{87}{4}$ ft., and breadth = $\frac{62}{4}$ ft.;
∴ cost of carpet = $(\frac{87\times62}{4\times4} \times \frac{144}{27} \times \frac{54}{36})$*d.* = £11. 4*s.* 9*d.*

(487) In 1 minute *A* runs $(2\frac{1}{3} \div 16\frac{4}{5})$ miles;
in 34 minutes *A* runs $\frac{7\times5\times34}{3\times84}$ miles, or, $\frac{5\times17}{18}$ miles;
in 34 minutes *B* runs $(\frac{18}{17}$ of $\frac{5\times17}{18})$ miles, or, 5 miles;
∴ length of course is $(2\frac{1}{3} + 5)$ miles, or, $7\frac{1}{3}$ miles.

(488) In 10 minutes the boat is carried back $\frac{10}{60}$ of 2 miles, or, $\frac{1}{3}$ mile;
∴ $\frac{10}{60}$ of rate of boat per hour in still water = $(1\frac{1}{4}+\frac{1}{3})$ miles;
∴ $\frac{1}{6}$ of rate = $\frac{19}{12}$ miles; ∴ rate = $9\frac{1}{2}$ miles;
hence in usual state of stream the boat goes 9 miles an hour against the stream, and ∴ it goes $1\frac{1}{4}$ miles in $8\frac{1}{3}$ minutes.

(489) Volume of cistern = $(12\times2\frac{1}{3}\times\frac{9}{12})$ cub. ft. = 21 cub. ft.;
volume of a sheet of paper = $\frac{8\times6}{300}$ cub. in.;
∴ number of sheets = $\frac{21\times1728}{2} \div \frac{8\times6}{300}$ = 113400.

(490) (1) The minute-hand has to gain 10 minute-divisions on the hour hand, and this it will do in $\frac{10\times12}{11}$ min., or, $10\frac{10}{11}$ min.
(2) The minute-hand has to gain 40 minute-divisions on the hour-hand, and this it will do in $\frac{40\times12}{11}$ min., or, $43\frac{7}{11}$ min.

(491) $(\frac{3}{8}$ of $\frac{14}{9}$ of $1760 \times \frac{32}{35})$ mèt. = $\frac{2\times352\times4}{3}$ mèt. = $938\frac{2}{3}$ mèt.

(492) Number of times = $\frac{1760\times3}{2\times6\cdot28}$ = $\frac{66000}{157}$ = $420\frac{60}{157}$.

(493) 5 per cent. is 1 shilling in the £;
∴ he has 218*d.* left out of 240*d.*;
∴ original income = $\frac{240}{218}$ of £545 = £$\frac{240\times5}{2}$ = £600.

(494) Interest = £$\frac{455 \times 4}{100 \times 4}$ = £4·55 = £4. 11*s*

P. W. = $\frac{100}{101}$ of £455;

∴ discount = £$\frac{455}{101}$ = £4. 10*s*. $1\frac{19}{101}$*d.*;

∴ difference is $10\frac{82}{101}$*d.*

(495) 4*s*. $3\frac{3}{5}$*d.* = 5·42 fr., or, $\frac{258}{5}$*d.* = $\frac{542}{100}$ fr.;

∴ 1*d.* = $\frac{542 \times 5}{100 \times 258}$ fr.;

∴ £1 = $\frac{542 \times 5 \times 240}{100 \times 258}$ fr. = $\frac{1084}{43}$ fr. = $25\frac{9}{43}$ fr.

(496) He may ride for $\frac{1}{3}$ of 5 hours, because he can then walk back in $\frac{2}{3}$ of 5 hours;

∴ he may ride $\frac{50}{3}$ miles, or, $16\frac{2}{3}$ miles.

(497) On each £90 invested in Russian Stock he gets £$\frac{4 \times 90}{100}$ income, or, £3·6;

∴ he gains £·6 income on each £90 Russian Stock;

∴ amount of Russian Stock = £$\frac{90 \times 200}{\cdot 6}$ = £$\frac{180000}{6}$ = £30,000.

(498) Call the place where the trains meet M;

the distance from L to M = 4 × rate of slow train in miles per hour;

distance from N to M = 1 × rate of quick train in miles per hour;

$$\therefore \frac{4 \times \text{rate of slow train}}{1 \times \text{rate of quick train}} = \frac{\text{distance from } L \text{ to } M}{\text{distance from } N \text{ to } M};$$

$$\text{but } \frac{\text{rate of slow train}}{\text{rate of quick train}} = \frac{\text{distance from } N \text{ to } M}{\text{distance from } L \text{ to } M};$$

∴ compounding the ratios (Art. 195),

$$\frac{4 \times (\text{rate of slow train})^2}{(\text{rate of quick train})^2} = 1;$$

∴ 2 × (rate of slow train) = rate of quick train.

(499) *A* and *A* and *B* and *C* do $(\frac{3}{20} + \frac{5}{24})$ daily;
A and *B* and *C* do $\frac{4}{15}$ daily;
∴ *A* can do $(\frac{3}{20} + \frac{5}{24} - \frac{4}{15})$ daily, or, $\frac{11}{120}$ daily;
∴ *A* could do the work in $\frac{120}{11}$ days, or, $10\frac{10}{11}$ days.

(500) £1 = $\frac{4233}{170}$ francs = $\frac{423 \cdot 3}{17}$ fr. = 24·9 fr.;
£1 = $\frac{503 \times 20}{400}$ fr. = $\frac{503}{20}$ fr. = 25·15 fr.

(501) $\dfrac{\frac{9}{4}}{\frac{8}{3}} + \dfrac{7\frac{7}{10}}{12\frac{5}{6}} + \frac{1}{2} + \frac{9}{160} = \frac{27}{32} + \frac{77 \times 6}{77 \times 10} + \frac{1}{2} + \frac{9}{160}$
$= \frac{27}{32} + \frac{6}{10} + \frac{89}{160} = \frac{135+96+89}{160} = 2.$

(502) ·01 × ·000001 = ·00000001;
·01 × 1000000 = 10000;
·000001 × 1000 = ·001.

(503) We have to compare the values of $\frac{14}{73}$ and $\frac{37}{193}$ of equal weights;
now $\frac{14}{73} = \frac{2702}{73 \times 193}$; and $\frac{37}{193} = \frac{2701}{73 \times 193}$;
∴ the former will be the heavier.

(504) £1650 = 3300 half-sovereigns,
= 3300 × $\frac{11}{25}$ darics,
= $\frac{3300 \times 11}{25} \times \frac{80}{3}$ drachmæ,
= $\frac{3300 \times 11 \times 80}{25 \times 3} \times \frac{13}{11}$ denarii = 45760 denarii.

(505) 1 out of 4 parts, or, 5 out of 20 parts in the first glass are spirit;
1 out of 5 parts, or, 4 out of 20 parts in the second glass are spirit;
∴ 9 out of 40 parts of the mixture are spirit;
∴ the ratio is 9 of spirit to 31 of water.

(506) 15 + 18 + 21 + 24 + 27 + 30 + 33 + ...
To make an average of 30, we must take one number to the right of 30 to one equidistant from 30 on the left, and hence we get the number of days 5 + 1 + 5, or, 11;
∴ the number of miles is 330.

(507) 15 men working 9 hours a day can finish the work in 16 days;
∴ to do it in 1 day 1 man must work (15 × 9 × 16) hours;
to do it in 12 days 18 men must work $\frac{15 \times 9 \times 16}{12 \times 18}$ hours, or, 10 hours.

(508) For £$3\frac{1}{4}$ income in the 3 per cents. I must pay £$\frac{3\frac{1}{4} \times 91\frac{5}{8}}{3}$, or, £$\frac{13 \times 733}{4 \times 3 \times 8}$, or, £$99\frac{25}{96}$;
hence since $\frac{1}{4}$ is less than $\frac{25}{96}$, the second stock is the better investment.

£1 invested in the 3 per cents. gives £$\frac{1 \times 3}{91\frac{5}{8}}$ income;

£1 invested in the $3\frac{1}{4}$ per cents. gives £$\frac{1 \times 3\frac{1}{4}}{99\frac{1}{4}}$ income;
difference = £$(\frac{13}{397} - \frac{24}{733})$ = £$\frac{1}{291001}$;
∴ amount to be invested = £$\frac{291001}{20}$ = £14550. 1*s.*

```
(509)     60481729 (7777      7                    387420489
          49                                       343
         ------                                    ------
  147 |  1148         21      2     14700           44420
      |  1029                         424 )
      |  --------                   ----- |
 1547 |   11917                     15124 |         30248
      |   10829                         4 )
      |  ----------                 -----          ------
15547 |    108829     216     9     1555200       14172489
      |    108829                     19521
      |  ----------                 -------
                                    1574721       14172489
                                                  --------
```

(510) The shorter in 125 years increases $\frac{5}{4}$ of 3·014 in., or, 3·7675 in.;
the longer has to increase (3·7675 − 1·02) in., or, 2·7475 in.;
∴ in 100 years it increases $\frac{4}{5}$ of 2·7475 in., or, 2·198 in.

(511) $\left(\frac{45}{7} \times \frac{62-55}{152-89}\right) \div \frac{1+\frac{3}{7}}{2} = \frac{45 \times 7}{7 \times 63} \div \frac{10}{14} = 1.$

(512)

```
36036 ) 258380 ( 7
        252252
        ------
          6128 ) 36036 ( 5
                 30640
                 -----
                  5396 ) 6128 ( 1
                         5396
                         ----
                          732 ) 5396 ( 7
                                5124
                                ----
                                 272 ) 732 ( 2
                                       544
                                       ---
                                       188 ) 272 ( 1
                                             188
                  ---------------------------
                   84 ) 188 ( 2
                        168
                        ---
                         20 ) 84 ( 4
                              80
                              --
                               4 ) 20 ( 5
                                   20
                                   --
```

∴ 2 and 4 are the numbers.

(513) Area of floor = $(15\frac{1}{2} \times 12\frac{3}{4})$ sq. ft. = $\frac{31 \times 51}{2 \times 4}$ sq. ft.;
length of carpet = $\frac{31 \times 51 \times 144}{2 \times 4 \times 24 \times 36}$ yd. = $\frac{31 \times 17}{16}$ yd.;
cost of carpet = $\frac{31 \times 17 \times 92}{16}$*d.* = £12. 12*s.* 6$\frac{1}{4}$*d.*

(514) Interest = £381. 5*s*. − £375. = £6. 5*s*.;
interest for 1 year on £375 = £$\frac{375\times4}{100}$ = £15;
∴ number of months = $\frac{6\cdot25\times12}{15} = \frac{75}{15} = 5$.

(515) £1206. 4*s*. 4*d*. = 289492*d*.; and £3. 10*s*. 4*d*. = 844*d*.;
∴ cubic content of the cube = $\frac{289492}{844}$ in. = 343 cub. in.;
∴ edge of cube = $\sqrt[3]{343}$ in. = 7 in.;
∴ superficial area of sides = (6 × 49) sq. in. = 294 sq. in.;
∴ cost of gilding = 147*d*. = 12*s*. 3*d*.

(516) Weight of gold = $\frac{423267}{3\cdot9}$ oz. troy
= $\frac{4232670\times6}{39\times175}$ lb. avoir. = $3721\frac{1}{35}$ lb. avoir.

(517) *A* can do $\frac{1}{2}$ of the work in an hour;
B can do $\frac{3}{8}$ of the work in an hour;
C can do $\frac{3}{8}$ of the work in an hour;
∴ *A*, *B*, and *C* can do $\frac{10}{8}$ in an hour;
∴ they can do the work in $\frac{8}{10}$ of an hour, or, 48 minutes.

(518) He reads (220 × 28 × 12) lines in $5\frac{1}{2}$ hours;
he reads 1 line in $\frac{11}{2\times220\times28\times12}$ hour;
he reads (400 × 36 × 14) lines in $\frac{11\times400\times36\times14}{2\times220\times28\times12}$ hours,
or, 15 hours.

(519) Distance passed over by train = $\frac{20\times1760\times18}{60\times60}$ yd.
= 176 yd.;
∴ length of bridge = (176 − 120) yd. = 56 yd.

(520) 20 men = 30 women, and 50 children = 30 women;
∴ (30 + 40 + 30) women receive £50 for 1 week's work;
∴ 100 women receive £50, and ∴ 1 woman receives 10*s*.

(521) $\frac{\frac{11}{4}-\frac{11}{9}}{\frac{19}{36}+\frac{3}{8}} \div \frac{22}{13} = \frac{55\times72}{65\times36} \times \frac{13}{22} = 1.$

(522)

```
              10747·4689 ( 103·67
              1
            ┌─────
     203    │ 747
            │ 609
            ├───────
    2066    │ 13846
            │ 12396
            ├─────────
   20727    │  145089
            │  145089
            └─────────
```

```
                5                  189119224
                                   125
                                   ─────────
     15         7        7500       64119
                         1099 ⎫
                         ──── ⎬
                         8599 ⎭     60193
                           49       ─────
                         ──────
    171         4        974700     3926224
                           6856
                         ──────
                         981556     3926224
                                    ───────
```

(523) Find the L. C. M. of 3, 7, 12, 14, which is 84.

(524) Money obtained from sale = £960;
stock purchased = £$\frac{960 \times 100}{108}$ = £888$\frac{8}{9}$;
first income = £30;
second income = £$\frac{960 \times 5}{108}$ = £$\frac{400}{9}$ = £44$\frac{4}{9}$;
∴ increase = £14$\frac{4}{9}$ = £14. 8*s.* 10$\frac{2}{3}$*d.*

(525) Length of side = $\frac{945 \times 1344}{1134}$ yd. = $\frac{1270080}{1134}$ yd.
= 1120 yd.;
acres in each = $\frac{1270080}{4840}$ ac. = $\frac{31752}{121}$ ac. = 262$\frac{50}{121}$ ac.

(526) Cubic content of room = (20 × 16 × 12) c. ft.;
weight of gold = $\frac{20 \times 16 \times 12 \times 19260}{16}$ lb. avoirdupois.
= $\frac{20 \times 12 \times 19260 \times 7000}{5760}$ lb. troy;
value of gold = £$\frac{12 \times 4 \cdot 25 \times 20 \times 1926 \times 7000}{48}$
= £286492500.

(527) For every 2 sovereigns in the bag there are 3 half crowns, and therefore $32\frac{1}{2}$ shillings;
now 2 + 3 + $32\frac{1}{2}$ = $37\frac{1}{2}$, and 150 ÷ $37\frac{1}{2}$ = 4;
hence there are 8 sovereigns, 12 half-crowns, and 130 shillings.

(528) *B* walks at the rate of (50 ÷ 12) mi., or, $4\frac{1}{6}$ mi. per hour;
∴ *B* walks 20 miles in (20 ÷ $4\frac{1}{6}$) hr., or $\frac{24}{5}$ hr.;
∴ *A* walks 20 miles in (1 + $\frac{24}{5}$) hr., or, $\frac{29}{5}$ hr.;
∴ *A* walks 50 miles in $\frac{5 \times 29}{2 \times 5}$ hr., or, $14\frac{1}{2}$ hr.;
∴ *A* reaches London at 6 hr. 30 min. P.M.

(529) We have to find a common multiple of 5 and 9, which must lie between 80 and 100, and which is therefore 90. Hence the exact amount is 90 cwt., or, $4\frac{1}{2}$ tons.

(530) The first strikes the 7th stroke after $\frac{6 \times 35}{11}$ sec.;
the second strikes the 7th stroke after $\frac{6 \times 25}{11}$ sec.;
the difference = $\frac{6 \times 10}{11}$ sec. = $\frac{1}{11}$ min

(531)

$$\begin{array}{r}
3004072905 \\
512648 \\
\hline
24032583240 \\
192260665920 \\
1538085327360 \\
\hline
1540031966602440
\end{array}$$

(532) $\frac{2}{31}$ of 961*d.* = 62*d.*;
$\frac{5}{43}$ of 1849*d.* = 215*d.*;
∴ difference = 153*d.* = 12*s.* 9*d.*

(533)

	mils.
	2030
	15
2 qr. is $\frac{1}{2}$ of 1 cwt.	30450
1 qr. is $\frac{1}{2}$ of 2 qr.	1015
14 lb. is $\frac{1}{2}$ of 1 qr.	507·5
7 lb. is $\frac{1}{2}$ of 14 lb.	253·75
	126·875
	m. 32353·125

= £32. 3 f. 5 c. 3·125 m.

(534) 3 × breadth × breadth = 30000 sq. yd.;
∴ square of breadth = 10000 sq. yd.;
∴ breadth = 100 yd.;
∴ length = 300 yd.;
hence diagonal = $\sqrt{(10000 + 90000)}$ yd.
= 316·2....yd.

(535) The sound comes in 6 seconds from the more distant vessel, and in 4 seconds from the nearer vessel. Hence the distance of the nearer vessel from the person is two-thirds of 2240 yd. Therefore the distance between the vessels is one-third of 2240 yd., or, $746\frac{2}{3}$ yd.

(536) *A* fires 10 times while *B* fires 9 times;
∴ *A* fires 55 times while *B* fires ($5\frac{1}{2}$ × 9) times, or, $49\frac{1}{2}$ times, that is, when *B* has only completed 49 shots;
∴ *B* has still to fire 6 shots.

(537) Money from sale of shares = £$(43 \times 11\frac{1}{2})$ = £$\frac{43 \times 23}{2}$;
annual income from stock = £$\frac{43 \times 23 \times 6}{2 \times 128}$ = £$\frac{2967}{128}$
= £23. 3*s*. $7\frac{1}{8}$*d*.

(538) The fast clock goes 1560 min., while the slow clock goes 1550 min.;

∴ while the slow clock goes 2160 min., the fast clock goes $\frac{156}{155}$ of 2160 min., or, $2173\frac{29}{31}$ min.;

∴ it must be put back $13\frac{29}{31}$ min.

(539) $\frac{17}{40} + \frac{8}{19}$ of $\frac{23}{40} = \frac{17}{40} + \frac{184}{760} = \frac{507}{760}$;

∴ $\frac{253}{760}$ of the ore = 506 tons;

∴ amount of ore = $\frac{506 \times 760}{253}$ tons = 1520 tons.

(540) Annual increase is 1 in 60, and therefore the population of each year is $\frac{61}{60}$ of the population of the preceding year, and so at the end of five years the population will be

$\left(\frac{61}{60}\right)^5$ of 10000000 = $\frac{844596301 00}{7776}$ = 10861578 nearly.

(541)

$$\begin{array}{rcrcrcr}
\text{tons} & & \text{cwt.} & & \text{qr.} & & \text{lb.} \\
13 & . & 5 & . & 3 & . & 11 \\
 & & & & & & 4 \\
\hline
53 & . & 3 & . & 1 & . & 16 \\
 & & & & & & 6 \\
\hline
319 & . & 0 & . & 1 & . & 12
\end{array}$$

(542)

$$\begin{array}{r|rcrcr}
 & \pounds & & s. & & d. \\
 & 65931 & . & 12 & . & 9 \\
 & & & & & 4 \\
\hline
3 & 263726 & . & 11 & . & 0 \\
\hline
9 & 87908 & . & 17 & . & 0 \\
\hline
 & \pounds 9767 & . & 13 & . & 0
\end{array}$$

(543) Carriage of 1 cwt. for 1 mile costs $\frac{2925}{135 \times 65}$*s.*;
carriage of 60 cwt. for 180 miles costs $\frac{2925 \times 6 \times 18}{135 \times 65}$*s.*, or, 36*s.*

(544) 1581 darics = $\frac{1581 \times 17}{16}$ guineas
= $\frac{1581 \times 17 \times 24}{16 \times 19}$ pistoles
= $\frac{1581 \times 17 \times 24 \times 38}{16 \times 19 \times 31}$ sequins, or, 2601 sequins.

(545) First 18*s.* is left out of £1;
then from 18*s.* we have to take $\frac{51}{480}$ of 18*s.*, or, $\frac{153}{80}$*s.*

∴ remainder = $\frac{1287}{80}$*s.*;

∴ $\frac{1287}{80}$*s.* remain out of 20*s.*;

∴ £1 remains out of £$\frac{20 \times 80}{1287}$;

∴ £2574 remain out of £$\frac{20 \times 80 \times 2574}{1287}$, or, £3200.

(546) £91½ produces an income of £$2\frac{7}{8}$;

∴ for an income of £230 he must invest £$\frac{230 \times 91\frac{1}{2}}{2\frac{7}{8}}$,
or, £7320.

(547) On £100 outlay he claims £160, but receives only three-eighths of £160, that is, £60. Thus he loses 40 per cent.

(548) Breadth of room = $\frac{4875}{20 \times 12\cdot5}$ ft. = $\frac{975}{2 \times 25}$ ft. = 19½ ft.;
area of walls = { (40 + 39) × 12·5 } sq. ft.
= 987½ sq. ft.;
cost of painting = 987½ sq. ft. = £4. 2*s.* 3½*d.*

(549) $\cdot041\dot{6} = \frac{375}{9000}$, and $\cdot0375 = \frac{375}{10000}$,
and these fractions are in the ratio 10 : 9;
hence 10 × number of inmates at first = 9 × number of inmates at first + 360;
∴ number of inmates = 360.
Also, since $\frac{375}{9000} = \frac{1}{24}$; number of masters was $\frac{360}{24}$,
or, 15,
and ∴ number of boys was 345.

(550) We have to find how far the ordinary train was behind the express, when the train from *B* met the express;
in 20 minutes the train from *B* went over 8⅓ miles;
in 20 minutes the ordinary train went over 6⅔ miles;
∴ the ordinary train was 15 miles behind the express;
now the express had 7½ miles start, and in 45 minutes it would gain 7½ miles more on the ordinary train, hence the express train had been 1 hour on the road when the train from *B* met it. Also, the train from *B* had been 1 hour on the road, and therefore it started at 1 o'clock.

(551) $\frac{3\cdot5}{50} = \frac{7}{100} = \cdot07$.

(552) $(\frac{11}{4} \times \frac{84}{11}) + \frac{3\times56}{2\times4\times3} = 21 + 7 = 3$.

(553) Length of circumference $= \frac{360\times1519}{22}$ miles;
diameter $= \frac{360\times1519\times7}{22\times22}$ miles $= 7908\frac{102}{121}$ miles.

(554) Cost of oranges $= \frac{100\times12}{16}d. = 75d.$;
second price $= \frac{100+10\frac{3}{4}}{12}d. = \frac{4300}{12\times4}d. = 89\cdot583\frac{1}{3}d.$;
∴ he saved $14\cdot583\frac{1}{3}d.$

(555) 1800 × number of posts counted in 2 min. = yards passed over in 1 hr.;
1760 × number of miles passed in 1 hour = yards passed over in 1 hr.;
thus, approximately, the statement of the question is true.

(556) $\frac{2}{5}$ of £18550 = £7420;
∴ income from 4 per cents. $= £\frac{7420\times4}{96} = £309.\ 3s.\ 4d.$;
income from 3 per cents. $= £\frac{11130\times3}{90} = £371$;
∴ new income = £680. 3*s*. 4*d*.;
old income $= £\frac{18550\times3\frac{1}{2}}{92\frac{3}{4}} = £700$;
∴ loss is £19. 16*s*. 8*d*.

(557) I can write 300 pages, working $7\frac{1}{2}$ hours a day, in 2 months;

I can write 1 page, working 1 hour a day, in $\frac{2\times7\frac{1}{2}}{300}$ months;

I can write 450 pages, working 9 hours a day, in $\frac{15\times450}{300\times9}$ months;

∴ I can do it in $2\frac{1}{2}$ months.

(558) The shares are as 1, 3, 6, 10, of which the sum is 20;
∴ *A* gets $\frac{1}{20}$ of £$8\frac{1}{3}$, or, $8\frac{1}{3}$*s.*, or, 8*s.* 4*d.*;
∴ *B* gets 25*s.*, *C* 50*s.*, *D* 83*s.* 4*d.*

(559) Cost price = $\frac{100}{92\frac{1}{2}}$ of 37 guin. = £42;
selling price = $\frac{112\frac{1}{2}}{100}$ of £42 = £47·25 = £47. 5*s.*

(560) Area of whole rectangle = (72×45) sq. yd.
= 3240 sq. yd.;
area of grass-plots = $(4 \times 27 \times 13\frac{1}{2})$ sq. ft.
= 162 sq. yd.;
∴ area to be gravelled = $(3240 - 162 - 36)$ sq. yd.
= 3042 sq. yd.;
∴ cost = 3042*d.* = £12. 13*s.* 6*d.*;
and depth of pond = $(252 \div 36)$ yd. = 7 yd.

(561) $\frac{3663270}{7254} = \frac{407030}{806} = \frac{203515}{403} = 505$;
$\frac{15000000}{32} = \frac{3750000}{8} = 468750$.

(562) $\frac{5\times36\times4840\times9}{66\times11}$ sq. ft. = $(5 \times 6 \times 40 \times 9)$ sq. ft.
= 10800 sq. ft.

(563) Annual profit = $\frac{12}{28} \times \frac{7}{2}$ of £3598. 13*s.* 5*d.*
= £5398. 0*s.* $1\frac{1}{2}$*d.*

(564) Cost price = $\frac{100}{112\frac{1}{2}}$ of £1. 18*s.* 3*d.* = £1. 14*s.*

(565) Circuit of room = $\frac{760}{10}$ ft., or, 76 feet, or, $(40 + 36)$ ft.
∴ breadth of room is $(36 \div 2)$ ft., or, 18 ft.;
∴ area of carpet = (20×18) sq. ft.;
∴ cost of carpet = $\frac{20\times18\times25}{9\times4}$*s.* = £12. 10*s.*

(566) Rent of the estate = £(15000 ÷ 25) = £600;
interest on mortgage = £$\frac{10000\times3}{100}$ = £300;
um received by purchaser = £(600 − 300 − 100)
= £200;
∴ rate of interest on his investment = £$\frac{200\times100}{5000}$ = £4.

(567) His gross receipts are decreased 35 per cent. by the fall in flour, and 5 per cent. by the lowering of trade expenses, and therefore 40 per cent. in all. Hence he can lower the price of the 5*d.* loaf 40 per cent., that is by $\frac{5\times40}{100}$*d.*, or, 2*d.*

(568) Ratio of costs is as 2 × 9 × 7 × 12 : 1 × 8 × 6 × 10½;
∴ cost of second vessel = $\frac{8\times6\times10\frac{1}{2}}{2\times9\times7\times12}$ of £6000
= £2000.

(569) Interest = $\frac{1}{5}$ of £$\frac{403\cdot2\times4}{100}$ = £$\frac{80\cdot64}{25}$ = £3·2256;
P. W. = $\frac{100}{100\frac{4}{5}}$ of £403·2 = $\frac{500}{504}$ of £403·2 = £400;
∴ difference = £3·2256 − £3·2 = £·0256 = 6·144*d.*

(570) Compound interest on £100 for 2 years is £8·16;
∴ sum required = £$\frac{6\times100}{\cdot16}$ = £$\frac{60000}{16}$ = £3750.

(571) Cube of number = $\frac{5\times337500}{4}$ = 421875;

	7		421875	
			343	∴ number is 75.
21	5	14700	78875	
		1075		
		15775	78875	

$\frac{\cdot000215\times\cdot0732}{3\cdot125} = \frac{\cdot000015738}{3\cdot125}$ = ·00000503616.

(573) Interest on £100 is £9;
∴ sum required = $\frac{100}{9}$ of £11. 17*s.* 9*d.* = £132. 1*s.* 8*d.*

(574) 1 lb. of bread when wheat is 1*s.* per bus. should sell
for $\frac{6}{4\frac{1}{2}\times 6}$*d.*;
150 lb. of bread when wheat is 9*s.* per bus. should sell
for $\frac{150\times 9\times 6}{4\frac{1}{2}\times 6}$*d.*;
∴ it sells for 300*d.*, or, £1. 5*s.*

(575) $\frac{99}{100}$ of a child's share = $\frac{2\times 97}{100}$ of a brother's share;
∴ a brother's share = $\frac{99}{194}$ of a child's share;
hence 5 times a child's share + $\frac{3\times 99}{194}$ times a child's share = £12670;
or, $\frac{1267}{194}$ times a child's share = £12670;
∴ a child's share = £1940, and a brother's share = £990;
and, when the legacy duty has been taken away, each child will receive £1920. 12*s.*, and each brother £960. 6*s.*

(576) $\frac{1}{5}+\frac{3}{8}=\frac{23}{40}$;
and ∴ $\frac{17}{40}$ of the estate = 50 acres;
∴ estate = $\frac{40\times 50}{17}$ ac. = $\frac{2000}{17}$ ac. = $117\frac{11}{17}$ ac.

(577) Interest on *B*'s debt to *A* = £$(5 \times 3\frac{1}{4} \times 4)$ = £65;
P. W. of *B*'s claim on *A* = $\frac{100}{103}$ of £320 = £$310\frac{70}{103}$;
∴ *B* has to pay £565 − £$310\frac{70}{103}$, or, £$254\frac{33}{103}$.

(578) Weight of block = $\frac{8\times 2\times 3\times 19\cdot 26\times 1000}{1728}$ oz. = 535 oz.
= 33 lb. 7 oz.

(579) 9 boys are equivalent to 6 men;
∴ since 12 men can do $\frac{3}{4}$ of the work in $6\frac{1}{2}$ hours;
1 man can do $\frac{1}{4}$ of the work in $\frac{13\times 12}{3\times 2}$ hours;
17 men can do $\frac{1}{4}$ of the work in $\frac{26}{17}$ hours,
or, $1\frac{9}{17}$ hours.

(580) Content of cistern = (1000 + 8) cub. in.
= 1008 cub. in.;
area of base = $(\frac{121}{81} - \frac{100}{81})$ sq. ft. = $\frac{21}{81}$ sq. ft.
= $\frac{112}{3}$ sq. in.;
∴ depth = $\frac{1008 \times 3}{112}$ in. = 27 in. = 2 ft. 3 in.

(581) $\frac{\frac{3}{5} \text{ of } 21}{20} = \frac{63}{100}$; $\frac{247\frac{1}{2}}{1760 \times 36} = \frac{495}{1760 \times 72} = \frac{1}{256}$.

(582)

$$\begin{array}{r|l} 2 & 8,\ 9,\ 20,\ 21,\ 22 \\ \hline 2 & 4,\ 9,\ 10,\ 21,\ 11 \\ \hline 3 & 2,\ 9,\ 5,\ 21,\ 11 \\ \hline & 2,\ 3,\ 5,\ 7,\ 11 \end{array}$$

∴ L. C. M. is 27720.

(583) £1. 16*s*. 8*d*. = 440*d*., and therefore he buys at the rate of $\frac{440}{112}$*d*., or, $\frac{55}{14}$*d*. per lb. Hence on an outlay of $\frac{55}{14}$*d*. he gains $(\frac{9}{2} - \frac{55}{14})$*d*., or, $\frac{4}{7}$*d*.;
∴ his gain per cent. is $\frac{4 \times 100 \times 14}{55 \times 7}$, or, $\frac{160}{11}$, or, $14\frac{6}{11}$.

(584) 7 men can mow 22 acres in 88 hours;
1 man can mow 1 acre in $\frac{88 \times 7}{22}$ hr., or, 28 hr.;
12 men can mow 360 acres in $\frac{28 \times 360}{12}$ hr., or, 840 hr.;
∴ they can do the work in 84 days.

(585) Number of bricks = $\frac{18729 \times 15 \times 12 \times 18}{9 \times 4\frac{1}{2} \times 3}$ = 499440.

(586) $\frac{1}{4}$ of a ton is 560 lb.;
$\frac{4\frac{1}{5}}{100}$ of 20000*d*. is 840*d*.;
∴ duty per lb. = $\frac{840}{560}$*d*. = $1\frac{1}{2}$*d*.

(587) Cost price of a quarter of the mixture = $\frac{4}{5}$ of 57*s*. 6*d*.
= 46*s*.;
thus on each quarter of the cheaper I gain 7*s*.;
and on each quarter of the dearer I lose 2*s*.;
∴ I must mix them in the ratio 2 : 7.

(588) 20 per cent. of the wheat grown in the country
= 10000000 quarters;
∴ wheat grown = (5 × 10000000) quarters = 50000000 quarters.

(589) His rate with the stream is $4\frac{1}{2}$ miles per hour;
his rate against the stream is $1\frac{1}{2}$ miles per hour;
∴ his rate in still water = (6 ÷ 2) miles per hour, or, 3 miles per hour;
∴ rate of the stream is $1\frac{1}{2}$ miles per hour.

(590) Money from sale of 3 per cents. = (£200 × $94\frac{1}{2}$)
= £18900;
interest from bank stock = £$\frac{18900 \times 8\frac{1}{2}}{225}$ = £714;
and, since his original income was £600, he gains £114.

(591)
$$\frac{\frac{11\times2\times18}{2\times9\times7} - 1 + \frac{7}{10}}{1 - \frac{3}{14}\text{ of }\left\{\frac{1}{2} + \frac{1}{2}\text{ of }\frac{\frac{1}{20}}{\frac{3}{20}}\right\}} = \frac{\frac{22}{7} - \frac{10}{7}}{1 - \frac{3}{14}\text{ of }\left\{\frac{1}{2} + \frac{1}{6}\right\}}$$
$$= \frac{\frac{12}{7}}{1 - \frac{4}{28}} = 2.$$

(592) $\frac{110}{1100} = \frac{1}{10} = \cdot1.$

(593) Area of floor = (14 × $12\frac{1}{2}$) sq. ft. = 175 sq. ft.;
area covered by carpet = ($\frac{23}{2}$ × $\frac{29}{3}$) sq. ft. = $111\frac{1}{6}$ sq. ft.;
floor cloth required = (175 − $111\frac{1}{6}$) sq. ft., or, $63\frac{5}{6}$ sq. ft.;
cost of floor cloth = $\frac{383\times6}{6\times9}$*s.* = £2. 2*s.* $6\frac{2}{3}$*d.*

(594) With £500 he can gain £50 in 7 months;
with £1 he can gain £1 in $\frac{7\times500}{50}$ months;
with £385 he can gain £$60\frac{1}{2}$ in $\frac{7\times121\times500}{50\times385\times2}$ months, or, 11 months.

(595) Rent of an acre = rent of $\frac{100}{247}$ hectares
$= \frac{100 \times 130}{247}$ francs
$=$ £$\frac{100 \times 130}{247 \times 25}$, or, £$\frac{40}{19}$, or, £2. 2*s.* $1\frac{5}{19}$*d.*

(596) P. W. $= \frac{100}{103}$ of £193. 2*s.* 6*d.* = £$\frac{100 \times 1545}{103 \times 8}$ = £187. 10*s.*

(597) *A*, *B* and *C* do $\frac{1}{4}$ of the work daily;
A and *B* do $\frac{1}{6}$ of the work daily;
B and *C* do $\frac{1}{8}$ of the work daily;
∴ *A* does $\frac{1}{4} - \frac{1}{8}$, or, $\frac{1}{8}$ daily;
C does $\frac{1}{4} - \frac{1}{6}$, or, $\frac{1}{12}$ daily;
∴ *A* and *C* can do $\frac{1}{8} + \frac{1}{12}$ daily, or, $\frac{5}{24}$ daily;
∴ they can do the work in $\frac{24}{5}$ days, or, $4\frac{4}{5}$ days.

(598) $460 + 805 + 391 = 1656$;
∴ first farmer employs $\frac{460}{1656}$ of 72 men, or, 20 men;
second farmer employs $\frac{805}{1656}$ of 72 men, or, 35 men;
third farmer employs $\frac{391}{1656}$ of 72 men, or, 17 men.

(599) Cost price $= \frac{100}{92}$ of £38. 5*s.*, or, £$\frac{3825}{92}$;
now $57 - \frac{3825}{92} = \frac{1419}{92}$;
∴ gain per cent. $= \frac{1419 \times 100}{3825} = \frac{1892}{51} = 37\frac{5}{51}$.

(600) 1 grain of gold is in content $\frac{1728}{1215 \times 24 \times 20 \times 12}$ cub. in.;
thickness of the leaf $= \frac{1728}{1215 \times 24 \times 20 \times 12 \times 56}$ in.;
number of leaves $= \frac{1215 \times 24 \times 20 \times 12 \times 56}{1728 \times 400} = 567$.

(601)
```
139) ·22101 ( ·00159          73) 53290000 (7300
     139                          511
     ---                          ---
      820                          219
      695                          219
      ---                          ----
      1251                          0000
      1251
      ----
```

$$\frac{1}{\cdot 0625} = \frac{10000}{625} = \frac{400}{25} = 16.$$

(602)

```
              1657059849 ( 40707
              16
         ------------
    807 |      5705
        |      5649
        |-----------
  81407 |    569849
        |    569849
        |-----------

        3                    48228544
                             27
                             --------
   9    6       2700         21228
                 576 )
                ---- }
                3276 {       19656
                  36 )       -----
                ------
  108   4     388800
                4336
              ------
              393136          1572544
                              1572544
                              -------
```

(603) 2470 in. of copper $= \frac{2470\times17}{13}$ in. of iron

$= \frac{2470\times17\times16}{13\times15}$ in. of tin

$= \frac{2470\times17\times16\times12}{13\times15\times19}$ in. of zinc

$= 2176$ in.

(604) P. W. of 6*s.* 10*d.* $= \frac{100}{102\frac{1}{2}}$ of 82*d.* = 80*d.* = 6*s.* 8*d.*

(605) Stock purchased in 3 per cents. $= £\frac{3000\times100}{80}$;
money from sale of this stock $= £\frac{3000\times84}{80}$;
income from first investment $= £\frac{3000\times3}{80} = £\frac{900}{8}$
$= £112\frac{1}{2}$;
income from second investment $= £\frac{3000\times84\times3\frac{1}{2}}{80\times96\frac{1}{4}}$
$= £114\frac{6}{11}$;
∴ increase $= £2\frac{1}{22} = £2.\ 0s.\ 10\frac{10}{11}d.$

(606) In 1 day 1 acre can be reaped by $\frac{16\times8}{152}$ men;
in 12 days 228 acres can be reaped by $\frac{10\times8\times228}{12\times152}$ men,
or, 16 men.

(607) £1. 4*s*. 6½*d*. = 589 halfpence = £$\frac{589}{480}$;
amount of £1 for 1 quarter at $\frac{589}{480}$ per cent. = £$\frac{48589}{48000}$;
∴ at end of 1 year the amount is £$\left(\frac{48589}{48000}\right)^4$, or,
£$\frac{5573715940860228241}{5308416000000000000}$ = £$\frac{557}{530}$ nearly
= £$\frac{105}{100}$, nearly, which is the amount of £1 at 5 per cent. simple interest. (See Art. 178.)

(608) 1 mile = (1760 × 36) in. = $\frac{63360}{39\cdot371}$ mètres
= 1609·306... mètres.

(609) 9¾*d*. = 39 farthings, and 1*s*. = 48 farthings;
the L. C. M. of 39 and 48 is 624, and hence 16 francs = 13 shillings;
taking the multiples of 16 and 13 successively, we find that the multiple of 16, which is greater by 27 than the same multiple of 13, is 144; hence the sum required is 117*s*., or, £5. 17*s*.

(610) The L. C. M. of 26, 18 and 15 is 1170, and hence the piers are vertically above each other at intervals of 1170 ft., or, 390 yd.;
if the ends of the bridge are reckoned as two of the three places in which the piers coincide, length of viaduct = (4 + 390 + 4 + 390 + 4) yd. = 792 yd.;
if the ends are not reckoned as two of the coincidences, length of viaduct = (390 + 4 + 390 + 4 + 390 + 4 + 390) yd. = 1572 yd.

(611)
$$\frac{1}{1+\cfrac{1}{2+\cfrac{1}{3+\frac{5}{21}}}}+\frac{1}{5+\cfrac{1}{4+\cfrac{1}{3+\frac{1}{3}}}}$$

$$=\frac{1}{1+\cfrac{1}{2+\frac{21}{68}}}+\frac{1}{5+\cfrac{1}{4+\frac{3}{10}}}=\frac{1}{1+\frac{68}{157}}+\frac{1}{5+\frac{10}{43}}$$

$$=\tfrac{157}{225}+\tfrac{43}{225}=\tfrac{200}{225}=\tfrac{8}{9}.$$

(612) P. W. = $\left(\frac{100}{103\cdot5}\right)^2$ of £374. 18*s*. 6$\frac{9}{10}$*d*.;
= $\frac{10000}{10712\cdot25}$ of 89982$\frac{9}{10}$*d*. = 84000*d*. = £350.

(613) 4466 sq. ft. 100 sq. in. = 643204 sq. in.;
∴ side = $\sqrt{}$ 643204 in. = 802 in. = 66 ft. 10 in.

(614) Divide in the proportion of 10, 64, 24, or, 5, 32, 12;
the men get $\frac{5}{49}$ of £4089. 9*s*. 2*d*. = £417 5*s*. 10*d*.;
the women get $\frac{32}{49}$ of £4089. 9*s*. 2*d*. = £2670. 13*s*. 4*d*.;
the boys get $\frac{12}{49}$ of £4089. 9*s*. 2*d*. = £1001. 10*s*.

(615) Money to be invested in second stock = £$\frac{276\cdot75\times96}{4\cdot5}$:
∴ stock to be sold = £$\frac{276\cdot75\times96\times100}{4\cdot5\times92\cdot25}$ = £$\frac{3\times9600}{4\cdot5}$
= £6400.

(616) $\frac{857142}{999999}$ of £10. 14*s*. 1*d*. = $\frac{6}{7}$ of £10. 14*s*. 1*d*.
= £9. 3*s*. 6*d*.;
also, ·85714 of 2569*d*. = 2201·99266*d*., which differs
from 2202*d*. by less than ·008*d*., that is, $\frac{1}{125}$*d*.

(617) 1 lb. of coffee = $\frac{2}{11}$ lb. of tea
= $\frac{2\times25}{11\times3}$ lb. of sugar
= $\frac{2\times25\times77}{11\times3\times112}$*s*. = 1*s*. 0$\frac{1}{2}$*d*.

(618) £400 for 3 months gives the same interest as £100 for 1 year, and since the rate is double that on the £327, the interest at the end of the year will be the same as the interest for a year on £327 + £200 at the smaller rate;

∴ smaller rate = $\frac{100}{527}$ of £13·175 = £2·5;

∴ the rates are $2\frac{1}{2}$ and 5 per cent.

(619) A gallon of the mixture costs him $\frac{100}{120}$ of 3*s*., or 2*s*. 6*d*.; now 2*s*. 6*d*. is $\frac{5}{8}$ of 4*s*., and therefore $\frac{3}{8}$ of a gallon of the mixture is water, that is, there are 3 pints of water in each gallon.

```
(620)    1                     7·000000000
                               1
                               ----
  3      9       300           6000
                 351 )
                 ---  |
                 651  }        5859
                  81 )         ----
                 --------
 57      1       108300         141000
                    571 )
                 -------  |
                 108871   }     108871
                      1 )       ------
                 --------
573      2       10944300       32129000
                    11464
                 --------
         .       10955764       21911528
                                --------
∴ cube root is 1·912...         10217472
```

(621) $\cdot 58\dot{3} = \frac{525}{900} = \frac{21}{36} = \frac{7}{12}$;

$\frac{7}{12}$ of 65 dwt. = $\frac{7 \times 65 \times 24}{12}$ gr. = 910 gr.

(622) Cost of 250 sheep = $\frac{100}{116\frac{2}{3}}$ of £532. 5*s*. 10*d*. = £456. 5*s*.;

cost of each sheep = $\frac{9125}{250}$*s*. = 36·5*s*. = £1. 16*s*. 6*d*.

(623) For £$2\frac{1}{8}$ during (5 × 20) hours we can have 25 burners;
for £1 during 1 hour we can have $\frac{25 \times 5 \times 20 \times 8}{17}$ burners;
for £$7\frac{13}{20}$ during (4 × 30) hours we can have
$\frac{153 \times 25 \times 5 \times 20 \times 8}{20 \times 4 \times 30 \times 17}$ burners, that is 75 burners.

(624) £16. 10*s*. is the interest on £550;
∴ rate of interest = $\frac{4}{3}$ of $\frac{100}{550}$ of £$16\frac{1}{2}$ = £4 per cent.

(625) The broker first offered $\frac{9}{10}$ of the value;
then $\frac{9}{10}$ of the value + £379·75 = $\frac{105\frac{1}{2}}{100}$ of the value;
∴ £379·75 = ($\frac{211}{200} - \frac{9}{10}$) of the value = $\frac{31}{200}$ of the value;
∴ the value = $\frac{200}{31}$ of £379·75 = £2450.

(626) For 3*s*. $9\frac{1}{2}$*d*. he gets at first $\frac{91}{13}$, or, 7 quarterns;
for 3*s*. $9\frac{1}{2}$*d*. he gets afterwards $\frac{91}{14}$, or, $6\frac{1}{2}$ quarterns;
∴ they must eat half a quartern less.

(627) The unit of length is $\sqrt[3]{\frac{1}{343}}$ ft., or $\frac{1}{7}$ ft.;
∴ the unit of area is $\frac{1}{49}$ sq. ft.;
∴ number required = 60 × 100 × 49 ≐ 294,000.

(628) Cost price per lb. = $\frac{7}{8}$ of 4*s*. 8*d*. = 49*d*.;
selling at 60*d*., he makes 11*d*. profit on an outlay of 49*d*.;
∴ profit per cent. = $\frac{100 \times 11}{49} = 22\frac{22}{49}$.

(629) 7 half-crowns + 5 florins + 3 shillings = 30*s*. 6*d*.;
£12. 4*s*. ÷ 30*s*. 6*d*. = 488 ÷ 61 = 8;
∴ the numbers are 56, 40, and 24.

(630) Area of walls = (80 × 6) sq. yd. + 2 (80 × 5) sq. yd.
= 1280 sq. yd.;
deduction for doors = (6 × 8 × 3) sq. ft. = 16 sq. yd.;
∴ number of pictures = $\frac{1264 \times 9}{8 \times 3}$ = 474.

(631)

		£	s.	d.	
		5354	15	0	= cost at £1 per cent.
				4	
4*s*. = $\frac{1}{5}$ of £1		21419	0	0	= ..... £4 ....
8*d*. = $\frac{1}{6}$ of 4*s*.		1070	19	0	= ..... 4*s*. ....
		178	9	10	= ..... 8*d*. ....
		£22668	8	10	= cost at £4. 4*s*. 8*d*.

(632) The difference = 20 min. 19·9 sec. = 1219·9 sec.;
∴ fraction = $\frac{1219\cdot9}{31556929\cdot7}$ = ·000038.....

(633) Price of railway share = $\frac{2}{3}$ of £$93\frac{1}{2}$ = £$\frac{187}{3}$
= £62. 6*s*. 8*d*.

(634) 4593 lb. carried 49 miles cost £$20\frac{19}{40}$;
∴ 1 lb. carried 1 mile costs £$\frac{20\frac{19}{40}}{4593\times49}$;
∴ 1531 lb. carried 35 miles cost £$\frac{1531\times35\times819}{4593\times49\times40}$,
or, £4. 17*s*. 6*d*.

(635) 240*d*. − 10*d*. − $\frac{230}{25}$*d*. = $220\frac{4}{5}$*d*.;
∴ gross rental = $\frac{240}{220\cdot8}$ of £437 = £475.

(636) Value of the Russian money = (2·25 × 38)*d*.;
number of Swedish dollars = $\frac{2\cdot25\times38\times2}{27}$ = $6\frac{1}{3}$;
∴ there must be given 6 dol. 16 skil.

(637) 15 masons build 200 sq. yd. in 60 hours;
1 mason builds 1 sq. yd. in $\frac{60\times15}{200}$ hours;
7 masons build 420 sq. yd. in $\frac{420\times60\times15}{7\times200}$ hours;
∴ they take 270 hours, or, 30 days.

(638) The average dividend is 13*s*. 6*d*.;
∴ debts = $\frac{20}{13\cdot5}$ of £675 = £1000.

(639) Cost of 567 cwt. is £1130. 9*s*. $1\frac{1}{2}$*d.*;
cost of 1161 cwt. is £2469. 10*s*. $10\frac{1}{2}$*d.*;
∴ cost of 1728 cwt. is £3600.
He sells 1728 cwt. for $\frac{112}{100}$ of £3600, or, £(112 × 36):
∴ he sells 1 lb. for $\frac{112\times36\times20\times12}{1728\times112}$*d.*, or, 5*d.*

(640) P. W. of £100 = $\frac{100}{104\frac{1}{2}}$ of £100 = $\frac{200}{209}$ of £100;
∴ cash price : credit price = 200 : 209.
Next, cash price = $\frac{200}{209}$ of £114. 1*s*. 7*d*. = £109. 3*s*. 4*d*.

(641) First find the square root of 3 to 12 places of decimals, which is 1·732050807568; and then find the square root of 4·732050807568 to 6 places of decimals, which is 2·175327.

(642) Feet passed over in 1 second = $\frac{77\times1760\times3}{87\times60} = 77\frac{77}{87}$;
revolutions of wheel = $\frac{77\times1760\times3}{11\frac{1}{2}} = 35353\frac{1}{23}$.

(643) The wages of 1 man for 1 week are in the first case $\frac{£43.\ 4s.}{18\times4}$, or, 12*s*.;
the wages of 1 man for 1 week in the second case are $\frac{£67.\ 10s.}{16\times5}$, or, $16\frac{7}{8}$*s*.;
∴ price of wheat in second case = $\frac{16\frac{7}{8}}{12}$ of 64*s*. = 90*s*.

(644) Interest on £500 for 1 month = £$\frac{5}{3}$;
∴ by the end of the two years the second contractor would have received
£(4850 + 35 + 30 + 25 + 20 + 15 + 10 + 5),
or, £4990;
∴ the first is greater by £10.

(645) Sum to be invested = £$\frac{91\frac{1}{8}\times105}{3}$ = £$\frac{25515}{8}$;
∴ legacy = $\frac{10}{9}$ of £$\frac{25515}{8}$ = £$\frac{28350}{8}$ = £3543. 15*s*.

(646) Cubic content of box = (42 × 19 × 22) c. in.
= 17556 c. in.;
cubic content of 160 books = $(160 \times \frac{19}{2} \times \frac{21}{4} \times \frac{7}{4})$ c. in. = 13965 c. in.;
∴ space yet to be filled = 3591 c. in.;
∴ number of books = $\frac{3591}{7 \times 4\frac{1}{2} \times 1}$ = 114.

(647) 4 boys and 2 men could do the work in 2 hours;
1 boy and 2 men could do the work in 3 hours;
∴ 3 boys do $\frac{1}{2} - \frac{1}{3}$, or, $\frac{1}{6}$ of the work every hour;
∴ a boy could do it in 18 hours;
hence 2 men do $\frac{1}{3} - \frac{1}{18}$, or, $\frac{5}{18}$ of the work in an hour;
∴ a man could do it in $\frac{36}{5}$ hr., or, $7\frac{1}{5}$ hours;
hence a boy and a man can do $\frac{1}{18} + \frac{5}{36}$, or, $\frac{7}{36}$ in an hour;
∴ a boy and a man can do it in $5\frac{1}{7}$ hours.

(648) 30029 rup. 4 ann. 6 pice = 5765622 pice;
interest = $\frac{5765622 \times 4\frac{1}{2}}{100}$ pice;
value = $\frac{57656 \cdot 22 \times 4 \cdot 5 \times 28 \cdot 5}{192}$*d.* = £160. 9*s*. 4·553203125*d.*

(649) Money from sale of stock = £$\frac{1250 \times 96}{100}$ = £1200;
income from railway stock = £$\frac{1200 \times 2\frac{1}{2}}{75}$ = £40;
original income = £$\frac{1250 \times 3}{100}$ = £37. 10*s.*;
∴ the increase is £2. 10*s.*

(650) 15376·248001 (124·001
1
22 | 53
44
244 | 976
976
248001 | 248001
248001

$\sqrt{\frac{31 \cdot 36}{39 \cdot 69}} = \sqrt{\frac{4 \cdot 48}{5 \cdot 67}} = \sqrt{\frac{\cdot 64}{\cdot 81}} = \frac{\cdot 8}{\cdot 9} = \frac{8}{9}.$

(651) Value of 63 oz. = $\frac{63 \times 20}{8}$ of 26*d.* = 4095*d.* = £17. 1*s.* 3*d.*

(652) $350{\cdot}4 \times {\cdot}0105 = 3{\cdot}6792$;
$\frac{3{\cdot}6792}{{\cdot}0000219} = \frac{36792000}{219} = 168000.$

(653) 1 man on full rations consumes 1 qr. in $\frac{49 \times 7800}{910}$ days;
6440 men on full rations consume 690 qr. in
$\frac{49 \times 7800 \times 690}{6440 \times 910}$ days;
∴ on half rations in $\frac{49 \times 7800 \times 690}{3220 \times 910}$ days, or, 90 days.

(654) $\frac{2}{3} + \frac{1}{9} = \frac{7}{9}$; and ∴ $\frac{2}{9}$ of the army = 2000 men;
∴ the army originally consisted of 9000 men.

(655) The faster train gains $6\frac{2}{3}$ miles an hour on the slower train, which has 40 miles start, and overtakes it in $(40 \div 6\frac{2}{3})$ hours, or, 6 hours;
∴ it travels $(6 \times 16\frac{2}{3})$ miles, or, 100 miles.

(656) In 56 hours 1260 tons of water are raised by 15 pumps;
in 1 hour 1 ton of water is raised by $\frac{15 \times 56}{1260}$ pumps;
in 168 hours 7560 tons of water are raised by
$\frac{15 \times 56 \times 7560}{168 \times 1260}$ pumps;
∴ it will require 30 pumps.

(657) Interest = $£\frac{266\frac{2}{3} \times 4\frac{1}{2}}{100 \times 4} = £3$;

P. W. = $\frac{100}{103\frac{3}{4}}$ of £83 = £80; and ∴ discount = £3.

(658) Since three-fifths are done in 24 days, two-fifths will take 16 days;
15 men can finish the work in (16×9) hours;
18 men can finish the work in $\frac{16 \times 9 \times 15}{18}$ hr., or, 120 hours;
∴ in 12 days they must work 10 hours a day.

(659) Cost of 1 hectolitre = (29 + ·01 + ·725 + ·29) fr.
= 30·025 fr.
cost of 1 bushel = $\frac{22}{64}$ of £$\frac{30\cdot025}{25\cdot2}$ = $\frac{66055}{8096}$*s.* = $8\frac{117}{736}$*s.*

(660) When *A* makes 15, *B* makes 12;
when *A* makes 15, *C* makes 8;
∴ *B* makes 12 when *C* makes 8;
∴ *B* makes 15 when *C* makes 10;
∴ *B* can give *C* 5 points.

(661) Divide 480 into 8 equal parts, each being 60; then one of the parts required is 180, and the other is 300.

(662) $$\frac{\frac{32}{9}-\frac{165}{99}}{\frac{88}{9}-\frac{58}{9}}\times\frac{1}{71}\times\frac{\frac{213}{99}}{\frac{31}{10}\times\frac{100}{990}}=\frac{320-165}{880-580}\times\frac{1}{71}\times\frac{21300}{3100}$$
$$=\frac{155}{300}\times\frac{3}{31}=\frac{5}{100}=\frac{1}{20}=\cdot05.$$

(663) 2 × breadth × breadth × $\frac{\text{breadth}}{2}$ = 4096 cub. ft.;
∴ cube of breadth = 4096 cub. ft.;
∴ breadth = 16 ft., length = 32 ft., height = 8 ft.

(664) 500 scudi = (52·5 × 50) fr.;
= $\frac{52\cdot5\times50\times16}{20}$*s.*;
= $\frac{52\cdot5\times50\times16\times12\times12}{20\times50}$ carl. = 6048 carl.

(665) Interest = interest on debt
discount = interest on present worth;
∴ interest − discount = interest on (debt − present worth)
= interest on the discount;
hence £$6\frac{1}{8}$ is the interest on £$21\frac{7}{8}$;
∴ the sum on which the interest is £28 is £$\frac{28\times21\frac{7}{8}}{6\frac{1}{8}}$, or, £100.

(666) Cost of mixture per gallon = $\frac{10}{11}$ of 16*s*. 6*d*. = 15*s*.;
$\therefore$ two gallons of the mixture cost 30*s*.;
$\therefore$ he gave 14*s*. 6*d*. and 15*s*. 6*d*. per gallon.

(667) Rental = $\frac{3}{2}$ of £150 = £225;
$\therefore$ capital expended = £$\frac{225 \times 100}{4\frac{1}{2}}$ = £5000;
$\therefore$ he spent on repairs £(5000 − 4624), or, £376.

(668) 1 acre = (4840 × 9) sq. ft., and 5 qr. = 40 bushels;
$\therefore$ produce of 1 sq. ft. = $\frac{40}{4840 \times 9}$ bus. = $\frac{1}{121 \times 9}$ bus.;
$\therefore$ weight of produce = $\frac{60\frac{1}{2}}{121 \times 9}$ lb. = $\frac{1}{18}$ lb.

(669) 39 sheep and 33 pigs cost £147;
7 sheep and 33 pigs cost £67;
$\therefore$ 32 sheep cost £80, that is, a sheep costs £2. 10*s*.;
$\therefore$ 11 pigs cost £49 − £32. 10*s*., or, £16. 10*s*.;
that is, a pig costs £1. 10*s*.

(670) Content of wall = (60 × 20 × 4) cub. ft.;
space occupied by bricks = $\frac{93\frac{3}{4}}{100}$ of 4800 cub. ft.
= (375 × 12) c. ft.;
$\therefore$ number of bricks = $\frac{375 \times 12 \times 1728}{9 \times 4\frac{1}{2} \times 4}$ = 48000.

(671) (*a*) $\frac{20}{39}$ of 1521*d*. − $\frac{10}{33}$ of 1089*d*. = 780*d*. − 330*d*.
= £1. 17*s*. 6*d*.

(*β*) ·65 of 90*s*. + ·0125 of 1360*d*. = 58·5*s*. + 17*d*.
= £2. 19*s*. 11*d*.

	£	s.	d.	
(672)	4	2	4	= price of 1 lb.
			7	
4 oz. is $\frac{1}{3}$ of 1 lb.	28	16	4	= price of 7 lb.
1 oz. is $\frac{1}{4}$ of 4 oz.	1	7	$5\frac{1}{3}$	= .... 4 oz.
10 dwt. is $\frac{1}{2}$ of 1 oz.		6	$10\frac{1}{3}$	= .... 1 oz.
2 dwt. is $\frac{1}{5}$ of 10 dwt.		3	$5\frac{1}{6}$	= .... 10 dwt.
12 gr. is $\frac{1}{4}$ of 2 dwt.			$8\frac{7}{30}$	= .... 2 dwt.
			$2\frac{7}{120}$	= .... 12 gr.
	£30	14	$11\frac{1}{8}$	= price of 7 lb. 5 oz. 12 dwt. 12 gr.

(673) When *A* gets £2, *B* gets £6 and *C* gets £15;
∴ *A*'s share = $\frac{2}{23}$ of £69 = £6;
B's share = $\frac{6}{23}$ of £69 = £18;
C's share = $\frac{15}{23}$ of £69 = £45.

(674) Weight of block = $\frac{20\cdot28\times2\cdot58\times2\cdot5\times7\cdot8\times1000}{16\times112\times20}$ tons,
= $\frac{507\times129\times39}{112\times8\times100}$ tons = $28\frac{41917}{89600}$ tons.

(675) $\frac{105}{300}$ of his property + $\frac{103}{600}$ of his property + $\frac{102}{200}$ of his property = £6190;
∴ $\frac{619}{600}$ of his property = £6190;
∴ his property was $\frac{600}{619}$ of £6190, or, £6000.

(676) P. W. = $\frac{100}{110}$ of £28 = £25. 9*s.* $1\frac{1}{11}$*d.*;
∴ difference = 5*s.* $1\frac{1}{11}$*d.*

(677) $\frac{2}{3}+\frac{5}{7}$ of $\frac{1}{3}+\frac{7}{8}$ of $\frac{2}{21}=\frac{2}{3}+\frac{5}{21}+\frac{1}{12}=\frac{83}{84}$;
∴ $\frac{1}{84}$ of the army = 500 men; and ∴ the army was 42000 men.

(678) 1 horse with 1 feed a day can be kept for 1 day for $\frac{£12.\ 8s.\ 0\frac{3}{4}d.}{9\times4\times21}$;
15 horses with 3 feeds a day can be kept for 36 days for $\frac{15\times3\times36}{9\times4\times21}$ of £12. 8*s.* $0\frac{3}{4}$*d.*;
∴ the cost is $\frac{15}{7}$ of £12. 8*s.* $0\frac{3}{4}$*d.*, or, £26. 11*s.* $6\frac{3}{4}$*d.*

(679) For the proof of this see the first part of the answer to Question 665.

(680) 1 square mile = 640 acres;
$\therefore$ value $= £(83827 \times 640 \times \frac{91}{8}) = £610260560$

(681) 1 lb. of tea $= \frac{50 \times 84}{70}$ lemons $= (5 \times 12)d. = 5s.$

(682) $100 \times 9 \times 924 = 100 \times 9 \times 11 \times 84$
$= 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 5 \times 5 \times 7 \times 11.$
To make this a perfect cube we must introduce the factor $2 \times 2 \times 5 \times 7 \times 7 \times 11 \times 11$, or, 118580.

(683) Amount invested $= £\frac{464 \times 91\frac{1}{2}}{3}$;
income in 4 per cents. $= £\frac{464 \times 91\frac{1}{2} \times 4}{3 \times 96}$
$= £589.\ 13s.\ 4d.$

(684) Cash price in notes $= \frac{19}{20}$ of 135 doll. = 128·25 doll.;
cash price in gold $= \frac{5}{6}$ of 128·25 doll. = 106·875 doll.;
payer should receive in gold (135 − 106·875) doll., or, 28·125 doll.;
$\therefore$ in notes $\frac{6}{5}$ of 28·125 doll., or, 33·75 doll.

(685) Selling price $= (45 \times 52 \times 3)s.$;
cost price $= \frac{100}{112\frac{1}{2}}$ of $(45 \times 52 \times 3)s. = £312$;
$\therefore$ price of 3rd butt $= £312 - £230 = £82.$

(686) A difference of 4*s.* per quarter makes a difference of 1*s.* $3\frac{3}{4}d.$ in the expense of keeping the horse for a week;
$\therefore$ the horse in 1 week eats $\frac{63}{4 \times 12 \times 4}$ quarters;
$\therefore$ in a year it eats $\frac{63 \times 52}{4 \times 12 \times 4}$ qr., or, $17\frac{1}{16}$ qr.

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(687) If the unit of measurement be 1 foot

breadth × $\frac{2}{3}$ of breadth × $\frac{3}{2}$ of breadth = 5832 c. ft.;

∴ cube of breadth = 5832 c. ft.;

∴ breadth = $\sqrt[3]{5832}$ ft. = 18 ft.;

∴ length is 27 ft., and height 12 ft.

(688) 100 scudi = $\frac{100 \times 45}{8}$ fr.;

= $\frac{100 \times 45 \times 4}{8 \times 5}$*s.*;

= $\frac{100 \times 45 \times 4 \times 72}{8 \times 5 \times 25}$ carl. = 1296 carl.

(689) As in Ex. 665, £1. 10*s.* 7$\frac{1}{2}$*d.* is the interest on £5. 9*s.* 4$\frac{1}{2}$*d.*;

∴ sum required = $\frac{2625}{735}$ of £7 = £25.

(690) Suppose he buys 2 lb. of black tea and 1 lb. of green; he sells the mixture for 15*s.*, and therefore it cost him $\frac{100}{125}$ of 15*s.*, or, 12*s.*;

now put aside 2*s.* of this, as the extra price of the pound of green tea, and divide the remaining 10*s.* into three equal parts, then we find 3*s.* 4*d.* to be the price of the black tea, and 5*s.* 4*d.* that of the green.

(691)

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              7                       365525875
                                     ·343
                                      ---
      21      1        14700           22525
                         211 ⎫
                       ----- ⎪
                       14911 ⎬         14911
                           1 ⎭         -----
                       -----
     213      5      1512300         7614875
                       10675
                     -------
                     1522975         7614875
                                     -------
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(692) The L. C. M. of 6, 7, 8 is 168, and we must therefore divide £146000 in the proportion of 28, 24, and 21;
∴ first son gets $\frac{28}{73}$ of £146000, or, £56000,
and the other sons get £48000 and £42000 respectively.

(693) £3. 17*s.* 10$\frac{1}{2}$*d.* = 1869 halfpence;
L. C. M. of 1869 and 480 is 3 × 623 × 160;
∴ 160 is the least number of ounces,
and 623 is the number of sovereigns.

(694) For every 3 days of the time he earned 4*s.* and paid 9*d.*, and therefore received 3*s.* 3*d.*;
also, $39 \div 3\frac{1}{4} = 12$;
∴ 3 × 12, or, 36 was the number of days required.

(695) *A*, *B*, and *C* together do $\frac{1}{2}$ of $(\frac{1}{4} + \frac{1}{6} + \frac{1}{8})$ daily;
∴ they do $\frac{13}{48}$ daily; ∴ they take $3\frac{9}{13}$ days.

(696) 1575 plethra $= \frac{1575 \times 124}{5}$ toises
$= \frac{1575 \times 124 \times 17}{5 \times 9}$ mètres
$= \frac{1575 \times 124 \times 17 \times 39}{5 \times 9 \times 35}$ yd. = 82212 yd.

(697) Interest on £93 for the first half year = £1·5;
interest on £94·5 for the second half year
$= £\frac{94 \cdot 5 \times 1 \cdot 5}{93} = £\frac{47 \cdot 25}{31}$;
∴ whole amount of interest $= £\frac{93 \cdot 75}{31}$;
∴ interest on £100 $= £\frac{100 \times 93 \cdot 75}{93 \times 31} = £\frac{3125}{961} = £3\frac{242}{961}$.

(698) *B* overtakes *A* in 3 hours, and *B* is then 12 miles from *P*. *C* is 10 miles from *P* when *B* turns back. *C* will have gone over five-ninths of the two miles when he meets *B*. Hence the place of meeting is 11$\frac{1}{9}$ miles from *P*.

(699) After the first operation *Q* contains 1 gall. of water and 1 gall. of wine, and *R* contains 1 gall. of water and 3 gall. of wine;

after the second operation *Q* contains $\frac{1}{2}$ a gall. of water and $\frac{1}{2}$ a gall. of wine and $\frac{1}{4}$ gall. of water and $\frac{3}{4}$ gall. of wine, and *R* contains $\frac{3}{4}$ gall. of water and $\frac{9}{4}$ gall. of wine and $\frac{1}{2}$ a gall. of water and $\frac{1}{2}$ a gall. of wine;

∴ *Q* contains $\frac{5}{4}$ gall. of wine and *R* contains $\frac{5}{4}$ gall. of water.

(700) Weight = $\frac{4840 \times 9 \times 144 \times 1000}{1728 \times 16 \times 112 \times 20}$ tons = $101\frac{127}{448}$ tons.

(701) $\frac{1}{4} \times \frac{1}{14} \times \frac{7}{7}$ of 168*s*. = $\frac{42}{14}$*s*. = 3*s*.

(702) $\frac{1}{8} + \frac{1}{3} + \frac{1}{20} = \frac{15+40+6}{120} = \frac{61}{120}$;

∴ he has left $\frac{59}{120}$ of £500, or, £245. 16*s*. 8*d*.

(703) Money from sale of Russian stock = £(104 × 19) = £1976;

income from Consols = $\frac{3}{95}$ of £$962\frac{2}{3}$ = £$\frac{152}{5}$ = £$30\frac{2}{5}$;

his original income was £76, and thus he has to get £$45\frac{3}{5}$ income from £$1013\frac{1}{3}$;

∴ rate of interest = £$\frac{45\frac{3}{5} \times 100}{1013\frac{1}{3}}$ = £$\frac{228 \times 100 \times 3}{5 \times 3040}$ = £$4\frac{1}{2}$.

(704) 210 = 2 × 105 = 2 × 3 × 35 = 2 × 3 × 5 × 7;

294 = 2 × 147 = 2 × 3 × 49 = 2 × 3 × 7 × 7;

336 = 2 × 2 × 84 = 2 × 2 × 2 × 2 × 3 × 7;

∴ numbers that will divide each are 2, 3, 6, 7, 14, 21, 42;

and L. C. M. is 2 × 3 × 5 × 7 × 7 × 2 × 2 × 2, or, 11760.

(705) 1 lb. troy = $\frac{144}{175}$ lb. avoirdupois (see p. 140);
weight of rings = $\frac{1050 \times 28}{12 \times 20 \times 24}$ lb. troy;
= $\frac{144 \times 1050 \times 28}{175 \times 12 \times 20 \times 24}$ lb. avoirdupois
= $\frac{21}{5}$ lb. avoirdupois;
weight of rings and box = ($\frac{21}{5}$ + $3\frac{1}{2}$) lb. avoirdupois
= $7\frac{7}{10}$ lb. avoirdupois;
cost of carriage = $\frac{144 \times 5 \times 77}{2240 \times 10}$*s.* = 2*s.* 5·7*d.*;
cost of insurance = 11·55 half-crowns = £1. 8*s.* 10·5*d.*;
∴ whole cost = £1. 11*s.* 4·2*d.*

(706) Interest for 1st year = £250;
interest for 2nd year = £275;
interest for 3rd year = £302·5;
interest for 4th year = £332·75;
interest for 5th year = £366·025;
the sum of these is £1526. 5*s.* 6*d.*; so that the interest to be gained after the 5th year is £201. 6*s.* 3·3*d.*;
now interest for 6th year = £402·6275
= £402. 12*s.* 6·6*d.*;
∴ $5\frac{1}{2}$ years is the time required.

(707) $10 \times 1\frac{1}{2} \times 3 + 30 \times 2 \times 2 + 100 \times 3\frac{1}{4} \times 1 = 490$;
$20 \times 1 \times 3 + 40 \times 1\frac{1}{2} \times 2 + 200 \times 4 \times 1 = 980$;
∴ *B* has to pay twice as much as *A*;
∴ *A* pays £20 and *B* pays £40.

(708) The first clock strikes 7 when the second strikes 5, and therefore the time is 7 o'clock.

(709) It is clear that, since there is half a day difference in the time of completion according as the boy or the man commences the work, the man does just twice as much in a day as the boy does.
hence together they do ($\frac{1}{13}$ + $\frac{2}{13}$) daily, or, $\frac{3}{13}$ daily;
∴ they will finish the work in $4\frac{1}{3}$ days.

(710) £$124\frac{1}{2}$ invested in the first company produces £5 interest;

£$124\frac{1}{2}$ invested in the second company buys $\frac{124\frac{1}{2}}{8\frac{1}{2}}$ shares;

these shares produce £$\frac{124\frac{1}{2}\times 4\frac{5}{8}\times 7\frac{1}{2}}{8\frac{1}{2}\times 100}$ interest, or, £$\frac{7221}{1360}$;

∴ the rates are as 5 : $\frac{7221}{1360}$, or, 6800 : 7221.

(711)

	£	s.	d.	
	7	7	$4\frac{1}{2}$	= cost of 1 ton
			11	
10 cwt. is $\frac{1}{2}$ of 1 ton	81	1	$1\frac{1}{2}$	= cost of 11 tons
5 cwt. is $\frac{1}{2}$ of 10 cwt.	3	13	$8\frac{1}{4}$	= ...... 10 cwt.
2 cwt. is $\frac{1}{5}$ of 10 cwt.	1	16	$10\frac{1}{8}$	= ...... 5 cwt.
1 qr. is $\frac{1}{8}$ of 2 cwt.		14	$8\frac{17}{20}$	= ...... 2 cwt.
		1	$10\frac{17}{160}$	= ...... 1 qr.
	£87	8	$2\frac{133}{160}$	= cost of 11 tons 17 cwt. 1 qr.

(712) 13 ac. 81 yd. = 63001 sq. yd.;

∴ side of field = $\sqrt{63001}$ yd. = 251 yd.;

∴ time required = $\frac{251\times 4\times 60}{3\frac{1}{2}\times 1760}$ min. = $9\frac{69}{77}$ min.

(713) For an income of $2\frac{1}{2}$ in the 3 per cents. I shall have to pay £$\frac{2\frac{1}{2}\times 94}{3}$, or, £$78\frac{1}{3}$, and therefore the 3 per cents. is the better investment.

(714) P. W. = $\left(\frac{100}{105}\right)^4$ of £881. 4*s.* $10\frac{7}{80}$*d.* (by Art. 178)

= $\left(\frac{20}{21}\right)^4$ of $\frac{16919847}{80}$*d.*

= $\frac{20\times 20\times 20\times 20\times 16919847}{194481\times 80}$*d.* = $(20\times 20\times 5\times 87)$*d.*

= £725.

(715) 35 men can complete the work in 38 days;
1 man can complete the work in (38 × 35) days;
19 men can complete the work in $\frac{38\times35}{19}$ days, or 70 days.

(716) They could have let the machine for £120;
of this one should have taken £90 and the other £30;
∴ the latter should pay the former £30.

(717) Here we have to find the L. C. M. of 32, 36, and 40, which is 1440;
hence they stop together at intervals of 1440 inches;
∴ number of times = $\frac{1760\times36}{1440}$ = 44.

(718) Since *B* gets £2750 at the end of two years, he receives $\frac{100}{110}$ of £2750, or, £2500;
A calculates £2500 to be the P. W. of £2725, that is, that the interest on £2500 for 2 years is £225;
∴ rate per cent. = £$\frac{225}{25\times2}$, or, £4½.

(719) With length of stroke 3 ft. it takes 75 hours for 5 pumps;
with length of stroke 1 ft. it takes 1 hour for (3 × 5 × 75) pumps;
with length of stroke 2½ ft. it takes 120 hours for $\frac{3\times5\times75}{2\frac{1}{2}\times120}$ pumps;
and since the strokes are 4 times as quick in the former case, we shall require $\frac{4\times3\times5\times75}{2\frac{1}{2}\times120}$ pumps, or, 15 pumps.

(720) His original income was £$\frac{3\frac{1}{2}\times18550}{92\frac{3}{4}}$, or, £700;
income from 4 per cents. = £$\frac{3710\times4}{96}$ = £$154\frac{7}{12}$;
income from 3 per cents. = £$\frac{14840\times3}{90}$ = £$494\frac{2}{3}$;
∴ total of new income = £$649\frac{1}{4}$;
∴ decrease = £700 − £$649\frac{1}{4}$ = £50. 15*s.*

(721) $\frac{6}{9}$ of 4*s.* 6*d.* = 3*s.*; 2·35 of 30*d.* = 5*s.* 10$\frac{1}{2}$*d.*;
·2375 of £2 = 9*s.* 6*d.*; and the sum is 18*s.* 4$\frac{1}{2}$*d.*;
also, fraction $= \frac{441}{126 \times 2} = \frac{49}{14 \times 2} = \frac{7}{4} = 1 \cdot 75$.

(722) 36 men dig (72 × 18 × 12) c. yd. in (8 × 16) hours;
1 man digs 1 c. yd. in $\frac{8 \times 16 \times 36}{72 \times 18 \times 12}$ hours;
32 men dig (64 × 27 × 18) c. yd. in $\frac{64 \times 27 \times 18 \times 8 \times 16 \times 36}{32 \times 72 \times 18 \times 12}$ hours;
∴ they take 288 hours, or, 24 days.

(723) Amount of rent = (240 × 24)*s.* = £288;
∴ total outlay = $£\frac{288 \times 100}{3\frac{3}{4}}$ = £7680;
∴ outlay on repairs = £7680 − £6500 = £1180.

(724) Income in 3 per cents. = $£\frac{3 \times 52\frac{1}{2}}{95\frac{7}{8}}$ = £1$\frac{493}{767}$ on each £100 of the railway stock, which originally produced an income of £1$\frac{5}{8}$;
now $\frac{493}{767}$ is greater than $\frac{5}{8}$, and ∴ he increases his income.

(725) 10 men and 6 boys can reap 23 ac. in 2 days;
9 men and 6 boys can reap 21 ac. in 2 days;
∴ 1 man can reap 2 ac. in 2 days;
∴ 1 man can reap 1 ac. in 1 day;
hence 3 boys can reap 3 ac. in 4 days;
∴ 1 boy can reap $\frac{1}{4}$ ac. in 1 day;
∴ the number of boys required is 2.

(726) In 1 minute the pipe discharges $\frac{312 \cdot 5 \times 16}{1000}$ c. ft. of water;
∴ length of the stream = $\frac{312 \cdot 5 \times 16 \times 1728}{1000 \times 5}$ inches;
∴ rate per hour = $\frac{312 \cdot 5 \times 16 \times 1728 \times 60}{1000 \times 5 \times 36 \times 1760}$ miles = 1$\frac{7}{11}$ miles.

(727) 15 turkeys and 9 fowls cost £12. 15*s.*;
2 turkeys and 9 fowls cost £3;
∴ 13 turkeys cost £9. 15*s.*, and ∴ 1 turkey costs 15*s.*;
∴ 9 fowls cost £1. 10*s.*, and ∴ 1 fowl costs 3*s.* 4*d.*

(728) $\frac{1}{20} + \frac{1}{7}$ of $\frac{19}{20} = \frac{1}{20} + \frac{19}{140} = \frac{13}{70}$;
∴ $\frac{57}{70}$ of his gross income is liable to income-tax;
then $\frac{5}{240}$ of $\frac{57}{70}$ of his income = 19 guineas;
∴ his income = $\frac{240 \times 70 \times 19}{5 \times 57}$ guineas = 1120 guineas
= £1176.

(729) P. W. of the bill = $\frac{100}{120}$ of £180 = £150;
the wine and picture are charged at £21 + £19, or, £40;
∴ he pays in cash £150 − £40, or, £110;
next, the cash price of the bill is to the usurer £110 + £10, or, £120;
∴ he gets £60 interest on £120 for 4 months, which is 50 per cent. for 4 months, and 150 per cent. for a year.

(730)

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9	0	2700	1000
90	3	270000	1000000
		2709	
		272709	818127
		9	
909	6	27542700	181873000
		54576	
		27597276	165583656
		36	
9108	5	2765188800	162289344000
		455425	138282221225
		2765644225	

∴ cube root is 3·0365...

(731)

32856
121711

361416 the result of multiplying the first line by 11
229992 the result of multiplying the first line by 700
3975576 the result of multiplying the third line by 11000

3998936616

(732) $\dfrac{\frac{28}{10} \times \frac{225}{99}}{\frac{1125}{990}} + \dfrac{\frac{40}{9} - \frac{255}{90}}{\frac{15}{9} + \frac{2627}{999}} \times \frac{2040}{225}$

$= \frac{28 \times 225}{1125} + \frac{145 \times 204 \times 111}{4292 \times 225} = \frac{28}{5} + \frac{29 \times 51 \times 111}{1073 \times 45}$

$= \frac{28}{5} + \frac{153}{45} = 9.$

(733) For 31 days, at $7\frac{1}{2}$*d.* the loaf, it cost 558*s.*;

for 1 day, at 1*d.* the loaf, it would cost $\frac{558}{31 \times 7\frac{1}{2}}$*s.*;

for 20 days, at $6\frac{1}{4}$*d.* the loaf, it would cost $\frac{558 \times 20 \times 6\frac{1}{4}}{31 \times 7\frac{1}{2}}$*s.*;

∴ for $\frac{2}{3}$ the number of persons it would cost $\frac{2 \times 558 \times 20 \times 25}{3 \times 31 \times 15 \times 2}$*s.*, or, £10.

(734) Rate per cent. $= \frac{100 \times 2 \times 52}{240} = \frac{520}{12} = 43\frac{1}{3}.$

(735) Write C. P. for the cost price in shillings;
then $\frac{21}{20}$ of C. P. − 1 = $\frac{11}{10}$ of $\frac{19}{20}$ of C. P.;
∴ $(\frac{21}{20} - \frac{209}{200})$ of C. P. = 1, or, $\frac{1}{200}$ of C. P. = 1;
∴ C. P. = 200, or, cost price = £10.

(736) His original income was £150, and his new income, £155;

∴ sum invested in $3\frac{1}{2}$ per cent. stock = £$\frac{155 \times 87\frac{1}{2}}{3\frac{1}{2}}$
= £3875;

∴ price of 3 per cents. = £$\frac{3875 \times 100}{5000}$ = £$77\frac{1}{2}$.

(737) $(\frac{21}{20})^2$ of sum − $\frac{11}{10}$ of sum = £5. 18*s*. 9$\frac{3}{4}$*d*.;
∴ $(\frac{441}{400} - \frac{11}{10})$ of sum = £5. 18*s*. 9$\frac{3}{4}$*d*.;
∴ $\frac{1}{400}$ of sum = £5. 18*s*. 9$\frac{3}{4}$*d*.;
∴ sum = £2376. 5*s*.

(738) Cubic yards in obelisk = $\frac{2}{3}$ of $\frac{113 \times 108}{27} = 301\frac{1}{3}$;
weight of a foot of granite = $\frac{600 \times 20 \times 112}{301\frac{1}{3} \times 27}$ lb.
= $165\frac{65}{339}$ lb.

(739) *A* runs 100 yards while *B* runs 96 yards;
A runs 100 yards while *C* runs 95 yards;
∴ *B* runs 96 yards while *C* runs 95 yards;
hence *B*, giving *C* 1 yard start, will overtake him at the end of 96 yards, and will therefore beat him in a hundred yards race.

(740) $\frac{1}{2}$ of content − 9 gallons = $\frac{1}{5}$ of content;
∴ $(\frac{1}{2} - \frac{1}{5})$ of content = 9 gall., or, $\frac{3}{10}$ of content = 9 gall.;
∴ content of vessel = 30 gallons.

(741) 100 links = 1 chain, and 10 square chains = 1 acre (p. 134);
∴ area = $\frac{12 \cdot 25 \times 5 \cdot 6}{10}$ ac. = 6·86 ac. = 6 ac. 3 ro. 17$\frac{3}{5}$ po.

(742) £5·7 − £4·125 = £1·575 = £1. 11*s*. 6*d*. = $\frac{3}{2}$ of a guinea.

(743) 21 qr. for 15 miles will cost 98*d*.;
1 qr. for 7$\frac{1}{2}$ miles will cost $\frac{98}{21 \times 2}$*d*.;
71 qr. for 7$\frac{1}{2}$ miles will cost $\frac{98 \times 71}{21 \times 2}$*d*. = 13*s*. 9$\frac{2}{3}$*d*.

(744) *A*, *B*, *B* and *C* do $(\frac{1}{2} + \frac{3}{5})$ in an hour;
A, *A*, *B*, *B*, *C*, *C* do $\frac{3}{2}$ in an hour;
∴ *A* and *C* do $(\frac{3}{2} - \frac{11}{10})$ in an hour;
∴ they take $\frac{10}{4}$ hr., or, 2$\frac{1}{2}$ hr.

(745) Cost price = $\frac{100}{107}$ of £69. 11*s*. = £65;
∴ loss is £65 − £61. 15*s*., or, £3. 5*s*.;
∴ loss per cent = $\frac{3\cdot25 \times 100}{65}$ = $\frac{325}{65}$ = 5.

(746) One man walks $\frac{3}{6}$ miles and the other $\frac{4}{6}$ miles;
∴ length of walk = ($\frac{3}{6}$ + $\frac{4}{6}$) miles = 1$\frac{1}{6}$ miles.

(747) Amount of stock in 3 per cents. = £$\frac{5187\cdot5 \times 100}{83}$;
money from sale of this stock = £$\frac{5187\cdot5 \times 85}{83}$
= £5312·5;
income from 4 per cents. = $\frac{3}{5}$ of £$\frac{5312\cdot5 \times 4}{96}$
= £132·8125;
income from $\frac{3}{5}$ of 3 per cents. = $\frac{3}{5}$ of £$\frac{5187\cdot5 \times 3}{83}$
= £112·5;
∴ difference = £20·3125 = £20. 6*s*. 3*d*.

(748) Interest on the true discount = 5*s*. 1$\frac{1}{4}$*d*. for 3 months;
interest on £100 = £1 for 3 months;
∴ true discount = 100 times 64$\frac{1}{4}$*d*.;
again, £1 is the true discount on £101;
∴ amount of bill = 101 × 100 × 64$\frac{1}{4}$*d*. = £2577. 12*s*. 1*d*

(749) Difference in retail price per cwt. = 448*d*.;
put C. P. for the cost price of a cwt. of the first in pence;
then $\frac{112}{100}$ of (C. P. + 240) − $\frac{105}{100}$ of C. P. = 448;
∴ $\frac{7}{100}$ of C. P. + $\frac{26880}{100}$ = 448;
∴ 7 times C. P. = 44800 − 26880 = 17920;
∴ C. P. = 2560;
hence £10. 13*s*. 4*d*. and £11. 13*s*. 4*d*. are the cost prices

(750) $\frac{1}{10} + \frac{1}{20} + \frac{1}{30} + \frac{1}{40} + \frac{1}{50} + \frac{1}{60} = \frac{147}{600} = \frac{49}{200}$;
∴ $\frac{151}{200}$ of the rod = 302 in.; ∴ the rod is 400 in.

(751) £10. 1*s*. 3*d*. = 9660*q*.; and £12. 11*s*. 6$\frac{3}{4}$*d*. = 12075*q*.;
∴ income-tax = $\frac{6 \times 12075}{9660}$*d*. = 7$\frac{1}{2}$*d*.

(752) 20 men can reap 105 ac. in 72 hours;
I man can reap I ac. in $\frac{72\times20}{105}$ hours;
16 men can reap 126 ac. in $\frac{72\times20\times126}{16\times105}$ hours;
∴ they take 108 hours, or, $6\frac{3}{4}$ days.

(753) $\frac{100}{120}$ of £245, or, £$\frac{5\times245}{6}$, is the cost of $187\frac{1}{2}$ cwt.;
∴ cost of I cwt. = £$\frac{5\times245\times2}{6\times375}$ = £I. I*s.* $9\frac{1}{3}$*d.*

(754) Interest for 1st year = £750;
interest for 2nd year = £795;
interest for 3rd year = £842·7;
∴ amount at end of 3rd year = £14887. 14*s.*;
now £15185. 9*s.* 0·96*d.* – £14887. 14*s.*
= £297. 15*s.* 0·96*d.*;
and interest on £14887. 14*s.* for $\frac{1}{3}$ year
= £297. 15*s.* 0·96*d.*;
∴ $3\frac{1}{3}$ years is the time required.

(755) $\frac{13}{388}$ of sum in $3\frac{1}{4}$ per cents. + $\frac{3}{90}$ of sum in 3 per cents.
= £500;
∴ $\frac{13}{388}$ of sum in $3\frac{1}{4}$ per cents. + $\frac{1}{30}$ of £14970 – $\frac{1}{30}$ of sum in $3\frac{1}{4}$ per cents. = £500;
∴ $(\frac{13}{388} - \frac{1}{30})$ of sum in $3\frac{1}{4}$ per cents. + £499 = £500;
∴ $\frac{390-388}{11640}$ of sum in $3\frac{1}{4}$ per cents. = £I;
∴ $\frac{1}{5820}$ of sum in $3\frac{1}{4}$ per cents. = £I;
∴ he invests £5820 in $3\frac{1}{4}$ per cents., and £9150 in 3 per cents.

(756) Cost of the 30 lb. = 20*s.* 3*d.* + 3*s.* 9*d.* = 24*s.*;
selling price = $\frac{125}{100}$ of 24*s.* = 30*s.*;
∴ he sells the mixture at I*s.* per lb.

(757) Rent amounts to $\{ (\frac{104}{100})^2 + \frac{104}{100} + 1 \}$ of £30
$= £\frac{31216 \times 30}{10000}$;
∴ I receive in all £1030 + £93·648 = £1123·648;
£1000 in 3 years would amount to $(\frac{104}{100})^3$ of £1000,
or, £1124·864;
∴ I lose £1·216, or, £1. 4*s.* 3·84*d.*

(758) 15*s.* is the interest of £20 (see Question 665);
∴ the sum $= £\frac{20\cdot75 \times 20}{\cdot75} =$ £553. 6*s.* 8*d.*;
and the rate, since £1 is the interest on £20 for a year, is 5 per cent.

(759) $3\frac{1}{2}$ per cent. on £5000 = £175;
∴ $\frac{233}{240}$ of gross income = £747. 5*s.* 10*d.* + £175
= £922. 5*s.* 10*d.*;
∴ gross income $= \frac{240}{233}$ of £922. 5*s.* 10*d.* = £950;
and income-tax = (950 × 7)*d.* = £27. 14*s.* 2*d.*

(760)

$$\begin{array}{r|l} 11 & 7\cdot00 \\ \hline 2 & \cdot\dot{6}\dot{3} \\ \hline & \cdot3181818\dot{1}\dot{8} \\ & \cdot0000397\dot{7}\dot{2} \\ \hline & \cdot31822159\dot{0} \end{array}$$

∴ the difference lies between
·0001 and ·0002.

$$\begin{array}{r} 3\cdot14159\,)\,1\cdot000000000\,(\,\cdot31831\ldots\ldots \\ 942477 \\ \hline 575230 \\ 314159 \\ \hline 2610710 \\ 2513272 \\ \hline 974380 \\ 942477 \\ \hline 319030 \\ 314159 \\ \hline \end{array}$$

(761) $\frac{5 \times 3 \times 11 \times 2 \times 13 \times 27}{9 \times 8 \times 15 \times 7 \times 18 \times 39} = \frac{11}{4 \times 7 \times 18} = \frac{11}{504}$;
$\cdot014 - \frac{3}{250} = \frac{14}{1000} - \frac{12}{1000} = \frac{1}{500}$;
$\frac{11}{504} + \frac{1}{500} = \frac{6004}{252000} = \frac{6\cdot004}{252} = \cdot023\dot{8}2539\dot{6}$.

(762) Cubic content of the plate = $\frac{8}{8}$ of a cub. inch;
thickness of new surface = $\{ \frac{8}{8} \div (7 \times 7 \times 9 \times 144) \}$
inches;
= $\frac{1}{8\times7\times7\times144}$ in. = $\frac{1}{56448}$ in.

(763) *C*'s share = $\frac{6}{7}$ of *D*'s share;
B's share = $\frac{4}{5}$ of $\frac{6}{7}$ of *D*'s share = $\frac{24}{35}$ of *D*'s share;
A's share = $\frac{2}{3}$ of $\frac{24}{35}$ of *D*'s share = $\frac{16}{35}$ of *D*'s share;
∴ $(1 + \frac{6}{7} + \frac{24}{35} + \frac{16}{35})$ of *D*'s share = £21000;
∴ $\frac{105}{35}$ of *D*'s share = £21000;
∴ *D*'s share = £7000;
∴ *C* gets £6000, *B* gets £4800, *A* gets £3200.

(764) £3. 12*s*. is the interest on £30;
∴ sum = £$\frac{33\cdot6\times30}{3\cdot6}$ = £280;
and rate per cent. per annum = $\frac{11\cdot2\times100}{280}$ = 4.

(765) Fare for 1 kilomètre = $\frac{23\cdot05}{374}$ fr.
= $\frac{23\cdot05\times12\times20}{374\times25\cdot225}$*d.*;
fare for 1 yard = $\frac{23\cdot05\times12\times20}{374\times25\cdot225\times1093\frac{1}{3}}$*d.*;
fare for 1 mile = $\frac{23\cdot05\times12\times20\times1760\times3}{374\times25\cdot225\times3280}$*d.*
= $\frac{461\times12\times4\times3\times10}{17\times1009\times41}$*d.* = $\frac{663840}{703273}$*d.*;
∴ the rates are as 663840 : 703273.

(766) *C* runs 1760 yd. while *D* runs 1700 yd.;
C runs 1760 yd. while *B* runs $\frac{1760\times1700}{1720}$ yd.;
C runs 1760 yd. while *A* runs $\frac{1760\times1760\times1700}{1720\times1740}$ yd.,
or, $\frac{1760\times3740}{3741}$ yd.;
∴ *C* wins by 1760 $(1 - \frac{3740}{3741})$ yd., or, $\frac{1760}{3741}$ yd.

(767) Interest = £1709. 7*s*. $7\frac{1}{3}$*d.* − £732. 11*s*. 10*d.*
= £976. 15*s*. $9\frac{1}{3}$*d.*;
interest for 1 year = $\frac{5\frac{1}{3}}{100}$ of £732. 11*s*. 10*d.*
= £39. 1*s*. $5\cdot17\dot{3}$*d.*;
∴ number of years = $\frac{234429\cdot\dot{3}}{9377\cdot17\dot{3}}$ = 25.

(768) $1350 = 2 \times 3 \times 5 \times 45 = 2 \times 3 \times 3 \times 3 \times 5 \times 5$;
$\therefore$ the factor required is 2×3, or, 6.

(769) $5 \times 50 + 6 \times 40 + 7 \times 35 = 250 + 240 + 245 = 735$;
$\therefore$ *A*'s tax is $\frac{50}{147}$ of £5. 2*s*. 1*d*. = $(50 \times 8\frac{1}{3})$*d*.
= £1. 14*s*. $8\frac{2}{3}$*d*.;
B's tax is $\frac{48}{147}$ of £5. 2*s*. 1*d*. = $(48 \times 8\frac{1}{3})$*d*.
=£1. 13*s*. 4*d*.;
C's tax is $\frac{49}{147}$ of £5. 2*s*. 1*d*. = $(49 \times 8\frac{1}{3})$*d*.
= £1. 14*s*. $0\frac{1}{3}$*d*.

(770) Cost price = $\frac{8}{9}$ of $5\frac{1}{3}$*s*. = $\frac{128}{27}$*s*.;
$(6 - \frac{128}{27})$*s*. = $\frac{34}{27}$*s*.;
$\therefore$ gain per cent. = $\frac{34 \times 100}{128} = \frac{425}{16} = 26\frac{9}{16}$.

(771) $\frac{3+4}{4+5} = \frac{7}{9}$; and $\frac{7}{9}$ is greater than $\frac{3}{4}$, because $\frac{28}{36}$ is greater than $\frac{27}{36}$;
also $\frac{7}{9}$ is less than $\frac{4}{5}$, because $\frac{35}{45}$ is less than $\frac{36}{45}$.

(772) 32 boys are equivalent to 20 men;
15 men can finish the work in 48 days;
20 men can finish the work in $\frac{48 \times 15}{20}$ days, or, 36 days.

(773) On each £100 borrowed he gets for interest
£$(\frac{5}{2} + \frac{5}{2} + \frac{5}{80})$;
$\therefore$ he gains £$(5\frac{5}{80} - 3\frac{1}{2})$, or, £$\frac{125}{80}$;
$\therefore$ he borrows £$\frac{200 \times 100}{\frac{125}{80}}$, or, £12800.

(774) Originally there are 56 lb. of saltpetre and 24 lb. sulphur. We have now to find what number bears the same ratio to 24 that 11 does to 4, and this number is $\frac{24 \times 11}{4}$, or 66. Hence we must add 10 lb. of saltpetre.

(775) Allowance for carriage = $\frac{2\frac{1}{2}}{100}$ of 448*s.* = 11·2*s.*;

∴ the customer has to pay 4·8*s.*, or, 4*s.* $9\frac{3}{5}$*d.*

(776) The debts amount to £1215. 19*s.* 2*d.*, or, 583660 halfpence;

the assets amount to £911. 19*s.* $4\frac{1}{2}$*d.*, or, 437745 halfpence;

∴ he pays in the pound $\frac{437745}{583660}$ × 20*s.*, or, $\frac{3}{4}$ × 20*s.*, or, 15*s.*

(777) 1*s.* $0\frac{1}{2}$*d.* = $\frac{25}{480}$ of £1, and $\frac{455}{480}$ of £1 remain after the deduction;

$\frac{95}{100}$ of $\frac{455}{480} = \frac{19 \times 91}{20 \times 96} = \frac{1729}{1920}$;

∴ $\frac{1729}{1920}$ of the gross income = £$864\frac{1}{2}$ = £$\frac{1729}{2}$;

∴ gross income = £$\frac{1920}{2}$ = £960.

(778) Cost price = $\frac{100}{105\frac{1}{2}}$ of £2. 17*s.* 9*d.* = $\frac{138600}{211}$*d.*;

cost of a cwt. at $7\frac{1}{2}$*d.* per lb. = 840*d.*;

∴ gain = 840*d.* − $\frac{138600}{211}$*d.* = $\frac{38640}{211}$*d.*;

∴ gain per cent. = $\frac{100 \times 38640}{138600} = \frac{920}{33} = 27\frac{29}{33}$.

(779) At the reduced speed it takes 70 min. to pass over $\frac{1}{5}$ of 147 miles;

∴ in 1 hour at the reduced speed the train goes $\frac{147 \times 6}{5 \times 7}$ miles;

∴ in 1 hour at original speed it goes $\frac{5}{4}$ of $\frac{147 \times 6}{5 \times 7}$ miles, or, $31\frac{1}{2}$ miles.

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780)          ·000904210312608l ( ·03007009
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         |  42049
         |____________________
6014009  |      541260081
         |      541260081
         |____________________
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(781) Interest = $£\frac{10921\frac{7}{8}\times 3\frac{2}{3}\times 4\frac{1}{2}}{100}$ = £1802·109375;

P. W. = $\frac{100}{116\frac{1}{2}}$ of £$10921\frac{7}{8}$ = £9375;

discount = £$10921\frac{7}{8}$ − £9375 = £1546·875;

∴ difference = £255·234375 = £255. 4*s*. $8\frac{1}{4}$*d.*

(782) Area of piece = $(1045\frac{1}{3} \times 568\frac{8}{13})$ sq. in.;

∴ cost of an acre = $£\frac{4840\times 9\times 144\times 234\frac{1}{2}}{1045\frac{1}{3}\times 568\frac{8}{13}}$

$= £\frac{4840\times 9\times 144\times 469\times 3\times 13}{3316\times 7392\times 2}$

$= \frac{55\times 9\times 9\times 67\times 13}{1568}$ = £$2474\frac{1073}{1568}$.

(783) Selling price to gain 4 per cent. = $\frac{104}{100}$ of £150

= £156;

he sells $\frac{1}{3}$ of the goods for $\frac{96}{100}$ of £50, or, £48;

he has to sell the rest for £108, which is £12 more than £96, at which price he would have sold the rest at the first rate;

∴ rate of increase per cent. = $\frac{12\times 100}{96} = 12\frac{1}{2}$.

(784) The scores in each successive innings after the first are $\frac{3}{4}$, $\frac{9}{16}$ and $\frac{27}{64}$ of the first score;

∴ $(1 + \frac{9}{16})$ of first score = $(\frac{3}{4} + \frac{27}{64})$ of first score + 50;

∴ $\frac{25}{16}$ of first score = $\frac{75}{64}$ of first score + 50;

∴ $\frac{25}{64}$ of first score = 50;

∴ the scores are 128, 96, 72, 54.

(785) Cost price of 1 lb. of first = $\frac{20}{19}$ of 30*d.* = $\frac{600}{19}$*d.*;

cost price of 1 lb. of second = $\frac{50}{57}$ of 40*d.* = $\frac{2000}{57}$*d.*;

∴ cost price of 2 lb. mixed = $\frac{3800}{57}$*d.* = $\frac{200}{3}$*d.*;

∴ gain = $(72 - \frac{200}{3})$*d.* = $\frac{16}{3}$*d.*;

∴ gain per cent. = $\frac{16\times 100}{200} = 8$.

(786) Distance A walks after meeting $B = (2 \times 3\frac{3}{4})$ miles $= 7\frac{1}{2}$ miles; and this is the distance that B has to walk before he reaches X;

∴ time required $= (7\frac{1}{2} + 3)$ hours $= 2\frac{1}{2}$ hours.

(787) $\frac{15}{400}$ of price per quarter $= 21d.$;

∴ price $= \frac{21 \times 400}{15}d. = 560d. = £2.\ 6s.\ 8d.$

(788) $\frac{7}{240}$ of second income $= \frac{14}{240}$ of first income $- £63$;

$\frac{1}{240}$ of second income $= \frac{2}{240}$ of first income $- £9$;

$\frac{1}{240}$ of first income $- £\frac{225}{240} = \frac{2}{240}$ of first income $- £9$;

∴ $£(9 - \frac{225}{240}) = \frac{1}{240}$ of first income;

∴ first income $= £2160 - £225 = £1935$.

(789) After the sale to A he has left $\frac{92}{100}$, or, $\frac{23}{25}$ of the flock · after the sale to B he has left $\frac{18}{25}$ of the flock $- 90$; after the sale to C he has left

$\frac{193}{200}$ of $\{ \frac{23}{25}$ of the flock $- 90 \}$;

∴ $\frac{193}{200}$ of $\{ \frac{23}{25}$ of the flock $- 90) = 579$;

∴ $\frac{23}{25}$ of the flock $- 90 = 600$;

∴ $\frac{23}{25}$ of the flock $= 690$;

∴ the flock consists of 750 sheep.

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(790)          5                         128558238823
                                         125
                                         ---
       15      0        7500              3558
      150      4        750000            3558238
                          6016⎫
                        ------⎪
                        756016⎬           3024064
                            16⎭           -------
                        --------
     1512      7        76204800           534174823
                          105889
                        --------           534174823
                        76310689           ---------
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	s.	*d.*	
(791)	5 .	$3\frac{1}{4}$	= cost of 1 yd.
		4	
	21 .	1	= cost of 4 yd.
		9	
	189 .	9	= cost of 36 yd.
1 ft. is $\frac{1}{3}$ of 1 yd.	5 .	$3\frac{1}{4}$	= ...... 1 yd.
1 ft. is $\frac{1}{3}$ of 1 yd.	1 .	$9\frac{1}{12}$	= ...... 1 ft.
6 in. is $\frac{1}{2}$ of 1 ft.	1 .	$9\frac{1}{12}$	= ...... 1 ft.
1 in. is $\frac{1}{6}$ of 6 in.		$10\frac{13}{24}$	= ...... 6 in.
		$1\frac{109}{144}$	= ...... 1 in.
	s. 199 .	$6\frac{103}{144}$	= cost of 37 yd. 2 ft. 7 in.

(792) $\frac{6}{5}$ of cost of 65 yards + $\frac{23}{20}$ cost of 65 yards
= £95. 9*s.* $4\frac{1}{2}$*d.*;
∴ $\frac{235}{100}$ of cost of 65 yards = £95. 9*s.* $4\frac{1}{2}$*d.*;
∴ $\frac{235 \times 65}{100}$ of cost of 1 yard = $\frac{45825}{2}$*d.*;
∴ $\frac{1}{100}$ of cost of 1 yard = $\frac{3}{2}$*d.*;
∴ cost per yard = 150*d.* = 12*s.* 6*d.*

(793) Weight of nitre = $(\frac{75}{100} + \frac{77}{100})$ of 10 cwt. = $15\frac{1}{5}$ cwt.
weight of sulphur = $(\frac{10}{100} + \frac{9}{100})$ of 10 cwt. = $1\frac{9}{10}$ cwt.
weight of charcoal = $(\frac{15}{100} + \frac{14}{100})$ of 10 cwt. = $2\frac{9}{10}$ cwt.

(794) Net income = $\frac{88}{100}$ of £3000 = £2640;
purchase money = £(26 × 3000) = £78000;
income from 3 per cents. = £$\frac{78000 \times 3}{97\frac{1}{2}}$ = £2400;
∴ difference = £240.

(795) The leak admits $18\frac{3}{4}$ tons of water in an hour;
∴ water gains $6\frac{3}{4}$ tons in an hour;
now $60 \div 6\frac{3}{4} = \frac{240}{27} = \frac{80}{9}$;
∴ rate = $(40 \div \frac{80}{9})$ miles per hour, or, $4\frac{1}{2}$ miles.

(796) Cost of $1\frac{3}{4}$ cwt. at 5*s.* $4\frac{1}{2}$*d.* per lb. = 1053*s.* 6*d.*;
cost of $2\frac{1}{4}$ cwt. at 3*s.* $3\frac{1}{2}$*d.* per lb. = 829*s.* 6*d.*,
whole cost = 1883*s.*;
sale of $2\frac{1}{2}$ cwt. at 4*s.* 6*d.* = 1260*s.*;
sum to be realised = 623*s.* + 376*s.* $7\frac{1}{5}$*d.* = 999*s.* $7\frac{1}{5}$*d.*

$$\therefore \text{ rate per lb.} = \frac{999s.\ 7\frac{1}{5}d.}{168} = 5s.\ 11\frac{2}{5}d.$$

(797) 4 per cent. on $\frac{4}{5}$ths of the capital is £32000;
∴ 4 per cent. on the whole capital is £40000;
∴ the capital is £1000000;
also, 10 per cent. on £200000 = £20000;
∴ £52000 is 52 per cent. of the receipts;
∴ receipts are £100000.

(798) $$\text{Interest} = \frac{2\frac{1}{2} \times \text{rate} \times \text{debt}}{100};$$

$$\text{discount} = \frac{2\frac{1}{2} \times \text{rate} \times \text{debt}}{100 + 2\frac{1}{2} \times \text{rate}};$$

$$\therefore \frac{\text{interest}}{\text{discount}} = \frac{100 + 2\frac{1}{2} \times \text{rate}}{100}, \text{ or, } \frac{87}{80} = 1 + \frac{\text{rate}}{40},$$

$$\text{or, } \frac{\text{rate}}{40} = \frac{7}{80}, \text{ or, rate} = 3\tfrac{1}{2}.$$

(799) 1 foot of *A* is as valuable as $\frac{9\times6}{11\times5}$, or, $\frac{54}{55}$ ft. of *B*;
53 feet of *A* weigh as much as $\frac{53}{51}$ of $\frac{561}{12}$ feet of *B*;
∴ 1 foot of *A* weighs as much as $\frac{11}{12}$ ft. of *B*;
again, 1 lb. weight of *A* is worth $\frac{702}{363}$*s.*;
also, 1 lb. weight of *B* is in length $\frac{11}{12}$ of the length of 1 lb. of *A*;
∴ 1 lb. weight of *B* is in value $\frac{55\times11}{54\times12}$ of 1 lb. of *A*;
∴ 180 lb. of *B* are worth $\frac{180\times55\times11\times702}{54\times12\times363}$*s.* = £16. 5*s.*

(800) 320 figures weigh $\cdot 475$ grains;

∴ 100102 figures weigh $\frac{100102 \times \cdot 475}{320}$ grains;

weight of paper $= \frac{100102 \times 23 \times 104 \cdot 68}{10 \times 4 \times 144}$ grains

$= \frac{50051 \times 23 \times 26 \cdot 17}{720}$ grains;

∴ weight of the whole $= \frac{100102 \times \cdot 475}{320}$ grains

$+ \frac{50051 \times 23 \times 26 \cdot 17}{720}$ grains

$= \frac{120932725 \cdot 69}{2880}$ grains

$= 41990 \cdot 52975347\dot{2}$ grains.

(801) $94073 \div 623 = 151$;

$1053101 + 151 = 1053252$.

(802) $\frac{4767531 - 476}{99990} = \frac{4767055}{99990} = \frac{953411}{19998}$.

(803) Cost price $= \frac{100}{75}$ of 12*s*. $= \frac{4 \times 12}{3}$*s*. = 16*s*.;

∴ I must sell it for 16*s*. + 4*s*., or, £1 per gall.

(804) Area of wainscot $= \{ (49\frac{1}{2} + 39) \times 10 \}$ sq. ft.

= 885 sq. ft.;

∴ cost $= £(\frac{885}{9} \times \frac{2}{3}) = £65\frac{5}{9}$.

(805) $\frac{\text{Rate of boat} + \text{rate of stream}}{\text{rate of boat} - \text{rate of stream}} = \frac{60}{55}$;

∴ 55 × rate of boat + 55 × rate of stream

= 60 × rate of boat − 60 × rate of stream,

∴ 115 × rate of stream = 5 × rate of boat;

∴ $\frac{\text{rate of stream}}{\text{rate of boat}} = \frac{5}{115} = \frac{1}{23}$.

(806) *A* does $\frac{3}{5}$ in 12 days and $\frac{3}{20}$ in 3 days;

∴ *A*, when working alone, does $\frac{15}{20}$, or, $\frac{3}{4}$;

∴ *A* and *B* do $\frac{1}{4}$ in 2 days;

∴ *B* does $(\frac{1}{8} - \frac{1}{20})$ daily, or, $\frac{3}{40}$ daily;

∴ *B* does the work in $13\frac{1}{3}$ days.

(807) $(4\frac{4}{23} \times 5\frac{3}{4}) \div 12 = \frac{96 \times 23}{23 \times 4 \times 12} = 2$;
$\therefore$ P. W. $= \frac{100}{102}$ of £2047. 13*s.* = £2007. 10*s.*;
again, interest = £1599·6722 − £1387·4
= £212·2722;
and interest for 1 year $= £\frac{1387 \cdot 4 \times 3 \cdot 6}{100}$ = £49·9464;
$\therefore$ number of years $= \frac{212 \cdot 2722}{49 \cdot 9464} = 4 \cdot 25 = 4\frac{1}{4}$.

(808) Rate in miles per hour $= \frac{6 \times 28 \times 5}{8 \times 30 \times 4}$ of $9\frac{1}{4} = 8$.

(809) Content of wall = (196 × 150 × 9) cub. in.
= 264600 cub. in.;
content of doorway = (75 × 28 × 9) cub. in.
= 18900 cub. in.;
$\therefore$ space to be occupied by brickwork = 245700 cub. in.,
$\therefore$ number of bricks $= \frac{245700}{12 \times 3 \times 3} = 2275$.

(810) 9 men and 15 women do $\frac{3}{8}$ of the work daily;
4 men and 14 children do $\frac{1}{6}$ of the work daily;
$\therefore$ 13 men, 14 children, and 15 women do $\frac{13}{24}$ daily;
$\therefore$ they do the work in $1\frac{11}{13}$ days.

(811) (*a*) $$\frac{2 + \dfrac{1}{3 - \frac{6}{31}}}{\frac{13}{8} \div \frac{7 \times 29}{4 \times 8}} = \frac{2 + \frac{31}{87}}{\frac{13}{7 \times 29}} = \frac{205 \times 7 \times 29}{13 \times 87} = 36\frac{31}{39};$$

(*β*) $$\frac{6\frac{3}{4} + 17\frac{2}{7} - 7\frac{1}{4}}{3\frac{1}{5} + 2\frac{1}{2} - 4\frac{1}{10}} = \frac{16\frac{11}{14}}{1\frac{3}{5}} = \frac{235 \times 5}{14 \times 8} = 10\frac{55}{112}.$$

(812) $5\frac{3}{4} \times 4\frac{1}{2} = \frac{23}{4} \times \frac{9}{2} = \frac{207}{8}$;
$\therefore$ P. W. $= \frac{800}{1007}$ of £1942. 13*s.* 5*d.* = £1543. 6*s.* 8*d.*

(813) Area = 1681 sq. in.; $\therefore$ side $= \sqrt{1681}$ in. = 41 in.

(814) Amount of legacy $= \frac{240}{9}$ of £19. 10*s.* = £520;
$\therefore$ amount divided = £520 − £19. 10*s.* = £500. 10*s.*;
$\therefore$ each received $\frac{£500.\ 10s.}{43}$, or £11. 12*s.* $9\frac{21}{43}$*d.*

(815) Work in foot-pounds $= 3\frac{3}{4} \times 8 \times 14 \times 50 = 21000$.

(816) Number of cub. ft. $= \frac{900 \times 88 \times 220 \times 1000}{1089} = 16000000$.

(817) Proceeds of sale = £$(93 \cdot 5 \times 100)$ = £9350;
income from 4 per cents. = £$\frac{9350 \times 4}{102}$ = £366. 13*s.* 4*d.*;
original income = £300;
∴ increase is £66. 13*s.* 4*d.*

(818) 5 men do $\frac{901}{1500}$ of the work in $\frac{53}{25}$ hours;
∴ 1 man does $\frac{17}{300}$ of the work in 1 hour:
∴ 3 men do $\frac{51}{100}$ of the work in 3 hours;
∴ 7 boys in 3 hours do $\frac{49}{100}$ of the work;
∴ 1 boy in 1 hour does $\frac{7}{300}$ of the work;
∴ 6 boys in 1 hour do $\frac{7}{50}$ of the work;
now $\frac{599}{1500}$ of the work remains to be done;
∴ time in hours $= \frac{599}{1500} \div \frac{7}{50} = \frac{599}{210} = 2 \cdot 8\dot{5}2380\dot{9}$.

(819) Area of 5 external sides
$= \{ (27 + 22) \times 13 + 27 \times 22 \}$ sq. ft.
$= (637 + 594)$ sq. ft. $=$ 1231 sq. ft.;
and, neglecting the thickness of the material, the area of the interior will also be 1231 sq. ft.;
∴ cost $= \frac{2462 \times 3}{9 \times 2}$*d.* $= 410\frac{1}{3}$*d.* = £1. 14*s.* $2\frac{1}{3}$*d.*

(820) 12*s.* 4*d.* is $\frac{37}{60}$ of £1;
∴ he first receives $\frac{37}{60}$ of £296, or, £182. 10*s.* 8*d.*;
the deficiency is then £113. 9*s.* 4*d.*;
next he receives $\frac{3}{16}$ of £113. 9*s.* 4*d.*, or, £21. 5*s.* 6*d.*;
∴ in all he receives £203. 16*s.* 2*d.*

(821) $\frac{1815020}{601} = 3020$; $\frac{1815 \cdot 02}{601} = 3 \cdot 02$; $\frac{181 \cdot 502}{601} = \cdot 302$.

(822) $62\frac{13}{24} + \frac{1}{8} = 62\frac{16}{24} = 62\frac{2}{3}$;
∴ income = £$\frac{15040 \times 4 \times 3}{188}$ = £960.

(823) Interest for 1st year = £82·95;
interest for 2nd year = £86·268;
interest for 3rd year = £89·71872;
∴ interest = £258·93672 = £258. 18*s*. 8·8128*d*.

(824) Cost of painting top and bottom = $\frac{6\times4\times2\times3}{2}$*d*. = 6*s*.;
square feet in area of sides = $\frac{82\frac{1}{2}}{1\frac{1}{2}} = \frac{165}{3} = 55$;
feet in circuit of sides = 20;
∴ height of box = $\frac{55}{20}$ ft. = 2 ft. 9 in.

(825) When the false hand goes 290 min. the true hand goes 300 min.;
∴ when the false hand goes 300 min. the true hand goes $\frac{300\times300}{290}$ min., or, $310\frac{10}{29}$ min.; that is, the true time is 5 hr. $10\frac{10}{29}$ min.

(826) 35 men in 45 days do the whole work;
∴ 7 men in 15 days do $\frac{1}{15}$ of the work;
hence 35 men in 15 days do $\frac{5}{15}$;
28 men in 15 days do $\frac{4}{15}$;
21 men in 15 days do $\frac{3}{15}$;
14 men in 15 days do $\frac{2}{15}$;
7 men in 15 days do $\frac{1}{15}$;
now $\frac{5}{15} + \frac{4}{15} + \frac{3}{15} + \frac{2}{15} + \frac{1}{15} = 1$;
∴ in 75 days the work is finished.

(827) Number of planks = $\frac{171\times160}{8\times10\times12} = \frac{171}{6} = 28\frac{1}{2}$;
weight = $\frac{171\times160\times\frac{1}{2}}{2}$ oz. = 6840 oz. = $427\frac{1}{2}$ lb.

(828) *A* does $\frac{1}{24}$ of the work daily;
∴ in half a day *A* does $\frac{1}{48}$ of the work;
hence in the two days when *A* and *B* are working together they do $\frac{7}{48}$ of the work;
∴ in 1 day *B* does $\frac{7}{96} - \frac{1}{24}$, or, $\frac{3}{96}$ of the work;
∴ *B* can do the work in 32 days.

(829) 44 shots have to be divided between centres and outers, so as to make up a score of 101;

∴ 3 × number of centres + 2 × (44 − number of centres) = 101;

∴ number of centres = 101 − 88 = 13;

∴ number of outers = 44 − 13 = 31.

(830) 30 children + 9 children + 1 child earn 90*s.*;

∴ 40 children earn 90*s.*; ∴ 1 child earns $\frac{9}{4}$*s.*;

∴ (36 + 6 + 5) children, or, 47 children earn $\frac{423}{4}$*s.*, or, £5. 5*s.* 9*d.*

(831)

	£	s.	d.	
	107	10	6	= cost of 1 acre.
			9	
	967	14	6	
			3	
2 ro. is $\frac{1}{2}$ of 1 ac.	2903	3	6	= cost of 27 ac.
1 ro is $\frac{1}{2}$ of 2 ro.	53	15	3	= ...... 2 ro.
20 po. is $\frac{1}{2}$ of 1 ro.	26	17	7·5	= ...... 1 ro.
5 po. is $\frac{1}{4}$ of 20 po.	13	8	9·75	= ...... 20 po.
1 po. is $\frac{1}{5}$ of 5 po.	3	7	2·4375	= ...... 5 po.
$\frac{1}{3}$ po. is $\frac{1}{3}$ of 1 po.		13	5·2875	= ...... 1 po.
$\frac{1}{3}$ po. is $\frac{1}{3}$ of 1 po.		4	5·7625	= ...... $\frac{1}{3}$ po.
		4	5·7625	= ...... $\frac{1}{3}$ po.
	£3001	14	9·5	= cost of 27 ac. 3 ro. 26$\frac{2}{3}$ po.

(832) Interest on £124 in 3 years = £14·88;

interest on £124 in 1 year = £4·96;

∴ rate per cent. = £$\frac{100 \times 4 \cdot 96}{124}$ = £4;

then interest on £1245 = £373·5:

interest on £1245 for 1 year at 4 per cent. = £49·8;

∴ number of years = $\frac{373 \cdot 5}{49 \cdot 8}$ = $\frac{1245}{166}$ = 7$\frac{1}{2}$.

(833) 10 men with 14 boys can earn $\frac{2 \times £7.\ 13s.}{6}$ in 1 day;
10 men with 15 boys can earn $\frac{5 \times £2.\ 2s.}{4}$ in 1 day;
∴ 1 boy can earn $\frac{£10.\ 10s.}{4} - \frac{£15.\ 6s.}{6}$, or, 1*s.* 6*d.* in 1 day;
∴ 2 men can earn 42*s.* – 18*s.*, or, 24*s.* in 4 days;
∴ 1 man can earn 3*s.* in 1 day;
∴ time required $= \frac{60 \times 20}{18+18} = \frac{1200}{36} = 33\frac{1}{3}$ days.

(834) He buys 1150 oysters for 60*s.*;
he sells 1150 oysters for $\frac{1150 \times 4}{12 \times 3}$*s.*, or, $127\frac{7}{9}$*s.*;
∴ gain per cent. $= \frac{67\frac{7}{9} \times 100}{60} = \frac{3050}{27} = 112\frac{26}{27}$.

(835) *B* runs 1749 yards while *C* runs 1696 yards;
∴ *B* runs 3 miles while *C* runs $\frac{1696}{1749}$ of (1760 × 3) yards, or, 5120 yards;
∴ *B* wins by (5280 – 5120) yards, or, 160 yards.

(836) $\frac{6}{240}$ of $\frac{1}{3}$ of $\frac{3}{11}$ of the income of the estate $= £\frac{11}{2}$;
∴ income $= £\frac{11 \times 11 \times 249}{6 \times 2} = £2420$.

(837) An income of £$4\frac{1}{4}$ in the $5\frac{1}{2}$ per cents. costs $£\frac{4\frac{1}{4} \times 105}{5\frac{1}{2}}$, or, £$81\frac{3}{22}$;
now $\frac{3}{22}$ is greater than $\frac{1}{2}$, and therefore the $4\frac{1}{4}$ per cents. is the better investment.

(838) While *B* walks 12 miles, *A* walks $\frac{9 \times 12}{10}$, or, 10·8 miles
∴ for an even race *A* must get 1·2 miles start;
∴ *A* has $\frac{1 \cdot 2 \times 60 \times 60}{5 \cdot 4}$ seconds, or, 800 seconds start;
hence *B* can give 799 seconds start and win.

(839) Cost price $= \frac{100}{106}$ of £132·5 = £125;
∴ gain per cent. $= £\frac{10 \times 100}{125} = £8$.

(840) 1 lb. troy = $\frac{576}{700}$ of 1 lb. avoirdupois;

∴ 1 oz. troy = $\frac{576 \times 16}{700 \times 12}$ of 1 oz. avoirdupois;

∴ number of pennies = $\frac{175 \times 576 \times 16 \times 3}{700 \times 12}$ = 576;

next, 5 halfpennies weigh $\frac{700 \times 12}{576 \times 16}$ oz. troy,

or, $\frac{175}{192}$ oz. troy;

∴ 1 halfpenny weighs $\frac{35}{192}$ oz. troy;

∴ 192 is the number of halfpennies required.

(841) 401 × 523 = 209723; and 3150501 − 209723 = 2940778.

(842)

$$\begin{array}{r|l}
 & 4957\cdot5681\ (70\cdot41 \\
 & 49 \\
\hline
1404 & 5756 \\
 & 5616 \\
\hline
14081 & 14081 \\
 & 14081 \\
\hline
\end{array}$$

$\frac{129\cdot4947}{60\cdot75} = \frac{14\cdot3883}{6\cdot75} = \frac{1\cdot5987}{\cdot75}$ $= \frac{\cdot5329}{\cdot25}$, and the square root of this fraction is $\frac{\cdot73}{\cdot5}$ = 1·46.

(843) Interest on £157½ for 5 years is £31½;

interest on £157½ for 1 year is £6$\frac{3}{10}$;

interest on £100 for 1 year = £$\frac{6\frac{3}{10} \times 100}{157\frac{1}{2}}$ = £$\frac{63 \times 100}{315 \times 5}$

= £4.

(844) Amount of stock purchased = £$\frac{6825 \times 100}{91}$ = £7500;

money from sale of £5000 stock = £93½ × 50

= £4675;

money from sale of £2500 stock = £85 × 25

= £2125;

∴ loss in money = £6825 − £6800 = £25;

income from first investment = £(75 × 3) = £225;

income from second investment = £(68 × 4½)

= £306;

∴ gain in income = £306 − £225 = £81.

(845) Interest on £273·75 for 10 days = £$\frac{273\cdot75\times5\times10}{365\times100}$
= £·375 ;.
∴ value of first bill = £273·75 + £·375 = £274. 2*s.* 6*d.*;
P. W. of £$456\frac{7}{8}$ = $\frac{100}{100\frac{10}{73}}$ of £$456\frac{7}{8}$ = £$\frac{7300\times3655}{7310\times8}$
= £$\frac{730\times5}{8}$;
∴ value of second bill = £456. 5*s.*

(846) That which he bought for £100 he sells for £175, but of this he receives only £$43\frac{3}{4}$, and therefore he loses $56\frac{1}{4}$ per cent.

(847) *A*'s rates are successively 400 yd., 399 yd., 398 yd., 397 yd., and these reckoned backwards must also be *B*'s rates : that is, *B* starts at a pace of 397 yd. a minute.

(848) Suppose the cask to contain 12 gallons, of which 9 are wine and 3 water,
then 9 − $\frac{3}{4}$ of part drawn = quantity of wine remaining;
and 3 − $\frac{1}{4}$ of part drawn = quantity of water remaining;
∴ 3 + $\frac{3}{4}$ of part drawn = quantity of water in the vessel when water is substituted for the part drawn off;
∴ 9 − $\frac{3}{4}$ of part drawn = 3 + $\frac{3}{4}$ of part drawn ;
∴ $\frac{6}{4}$ of part drawn = 6 ;
∴ part drawn = 4 gallons, that is, one-third of the mixture.

(849) £420. 16*s.* $1\frac{1}{2}$*d.* = 100873·5*d.*, and 4*s.* 2*d.* = 50*d.*;
∴ number of dollars = $\frac{100873\cdot5}{50}$ = $\frac{201747\cdot0}{100}$
= 2017 dol. 47 cents.

(850) 17 mi. 6 fur. 82 yd. $1\frac{1}{2}$ ft. = 93967·5 feet
= $\frac{93967\cdot5}{1760\times3}$ miles
= $\frac{8\times93967\cdot5}{5\times1760\times3}$ kilom.
= 28·475 kilom.

(851)

	£	s.	d.	
	57	6	3	= cost of 1 ton
			10	
	573	2	6	
			10	
	5731	5	0	= cost of 100 tons
2 qr. is $\frac{1}{40}$ of 1 ton	171	18	9	= ..... 3 tons
1 qr. is $\frac{1}{2}$ of 2 qr.	1	8	$7\frac{7}{8}$	= ..... 2 qr.
14 lb. is $\frac{1}{2}$ of 1 qr.		14	$3\frac{15}{16}$	= ..... 1 qr.
2 lb. is $\frac{1}{7}$ of 14 lb.		7	$1\frac{31}{32}$	= ..... 14 lb.
		1	$0\frac{9}{32}$	= ..... 2 lb.
	£5905	14	$11\frac{1}{16}$	= cost of 103 tons 3 qr. 16 lb.

(852) Interest on £176. 5*s*. for 1 year = £5. 5*s*. 9*d*.;

∴ rate per cent. = $\frac{100}{176 \cdot 25}$ of $5\frac{23}{80}$ = 3;

interest on £1075·5 for 1 year = £32·265;

and £1559·475 − £1075·5 = £483·975;

∴ time in years = 483·975 ÷ 32·265 = 15.

(853) ·078125) 21·843750 (279

156250

621875

546875

750000

703125

46875

the remainder is ·046875 gall. = ·375 pint = $\frac{3}{8}$ pint.

(854) Each has $\frac{8}{3}$ loaves for his meal;

∴ the first gives the third $\frac{7}{3}$ loaves;

the second gives the third $\frac{1}{3}$ loaf;

∴ he pays the first 7 halfpence and the second 1 halfpenny.

(855) $\frac{2}{3} \times 2\frac{1}{2} = \frac{5}{3}$;

∴ P. W. = $£\frac{100 \times 44\frac{11}{60}}{\frac{5}{3}} = £\frac{100 \times 2651 \times 3}{5 \times 60} = £2651$;

∴ amount of bill = £2651 + £44. 3*s.* 8*d.* = £2695. 3*s.* 8*d.*

(856) Income = $£\frac{5012 \times 3}{89\frac{1}{2}} = £\frac{5012 \times 6}{179} = £168$;

decrease of income = 168*d.* = 14*s.*

(857)			*s.*	*d.*
	Cost of strawberries	=	10 .	6
	cost of cream	=	1 .	3
	cost of sugar	=	2 .	2
	cost of ice	=		6
	whole cost	=	*s.*14 .	5

the 2 boys pay $\frac{4}{7}$ of 14*s.* 5*d.*, or, 8*s.* $2\frac{6}{7}$*d.*;

∴ they receive as change 1*s.* $9\frac{1}{7}$*d.*

(858) 9 rabbits eat as much as 15 guineapigs;

∴ time = $\frac{5}{20}$ of a month, or, $\frac{1}{4}$ of a month.

(859) Cost price of first horse = $\frac{100}{125}$ of £100 = $£\frac{400}{5}$ = £80;

cost price of second horse = $\frac{100}{75}$ of £100 = $£\frac{400}{3}$

= £$133\frac{1}{3}$;

∴ he loses £$213\frac{1}{3}$ − £200, or, £13. 6*s.* 8*d.*

(860) £2 is the interest of the discount (see Question 665) for 6 months;

£2 is also the interest of £100 for 6 months;

∴ discount = £100 and interest = £102;

∴ the sum = $£\frac{102 \times 100}{2}$ = £5100.

(861) $\frac{58620}{990} \times \frac{4605}{990} = \frac{1954}{33} \times \frac{1535}{330} = \frac{2999390}{1089} = 275{\cdot}41\ldots\ldots$

(862) $500 \times 12 = 6000$ ∴ *A*'s share $= \frac{60}{259}$ of £$932\frac{2}{5}$
$= £216$;
$700 \times 10 = 7000$ *B*'s share $= \frac{70}{259}$ of £$932\frac{2}{5}$
$= £252$;
$650 \times 10 = 6500$ *C*'s share $= \frac{65}{259}$ of £$932\frac{2}{5}$
$= £234$;
$800 \times 8 = 6400$ *D*'s share $= \frac{64}{259}$ of £$932\frac{2}{5}$
$= £230.\ 8s.$
sum $= 25900$

(863) Income from the company = £12. 10*s*.;
income from Cape stock $= £\frac{250 \times 6}{100} = £14.\ 5s.\ 8\frac{4}{7}d.$;
result from first investment = £250 + £62. 10*s*.
= £312. 10*s*.;
result from second investment $= \frac{20}{21}$ of £250 + £$71\frac{3}{7}$
$= £307\frac{11}{21}$;
∴ the first is better by £$312\frac{1}{2}$ − £$307\frac{11}{21}$, or, £$2\frac{41}{42}$.

(864) Fare for 1 mile $= \frac{8 \times 6}{5}$ cent. $= \frac{8 \times 6 \times 240}{5 \times 2520}d. = \frac{32}{35}d.$;
∴ the fares are as 32 : 35.

(865) The up train performs the journey in 110 min., the down train in 132 min.;
∴ their rates are as 6 : 5;
at 3.30 P.M. the up train has gone over $\frac{20}{110}$ or $\frac{2}{11}$ of the distance;
we have now to divide $\frac{9}{11}$ in the ratio 6 : 5, and we find that when the trains meet the up train has gone over $\frac{54}{121} + \frac{2}{11}$ of the whole distance;
the up train passes over $\frac{1}{11}$ of the whole distance in 10 minutes;
the up train passes over $\frac{76}{121}$ of the whole distance in $\frac{760}{11}$ minutes;
∴ time of meeting is 3 hr. 10 min. + 1 hr. $9\frac{1}{11}$ min., or, 4 hr. $19\frac{1}{11}$ min.

(866) $(6\frac{6}{17} \times 5\frac{2}{3}) \div 12 = 3$;
  ∴ P. W. $= \frac{100}{103}$ of £2034·25 = £1975 ;
  ∴ discount = £2034. 5*s.* − £1975 = £59. 5*s.*

(867) On 1387400 mils the interest for 3 years is 187299 mils, and the interest for 1 year is 62443 mils;
  ∴ rate $= \frac{62443 \times 100}{13874} = 4\frac{1}{2}$.

(868) Rate of second boat $= \frac{6 \times 34 \times 4}{8 \times 27 \times 5}$ of $\frac{75}{8}$ miles per hr.
  $= 7\frac{1}{12}$ miles.

(869) Content of brickwork = { (224 × 150 − 75 × 32) × 9 } cub. ft.
  = { (33600 − 2400) } × 9 cub. ft.
  = (31200 × 9) cub. ft.;
  number of bricks $= \frac{31200 \times 9}{12 \times 4 \times 3} = 1950$.

(870) 3 men and 5 women do $\frac{1}{8}$ of the work daily;
  1 man and 3 children do $\frac{1}{24}$ of the work daily ;
  ∴ 4 men and 5 women and 3 children do $\frac{1}{6}$ daily ;
  but 5 women and 3 children do $\frac{1}{12}$ daily ;
  ∴ 4 men do $\frac{1}{12}$ daily ;
  .. a man does $\frac{1}{48}$ daily;
  hence 5 women do $\frac{1}{8} - \frac{1}{16}$, or, $\frac{1}{16}$ daily ;
  ∴ a woman does $\frac{1}{80}$ daily;
  also 3 children do $\frac{1}{12} - \frac{1}{16}$, or, $\frac{1}{48}$ daily ;
  ∴ a child does $\frac{1}{144}$ daily ;
  thus their strength is as $\frac{1}{48} : \frac{1}{80} : \frac{1}{144}$, or, $\frac{1}{3} : \frac{1}{5} : \frac{1}{9}$, or, $\frac{45}{3} : \frac{45}{5} : \frac{45}{9}$, or, 15 : 9 : 5.

(871)

	£	*s.*	*d.*	
2*s.* 6*d.* is $\frac{1}{8}$ of £1	2005	6	8	= tax at £1 in the £
1*s.* 3*d.* is $\frac{1}{2}$ of 2*s.* 6*d.*	250	13	4	= ..... 2*s.* 6*d.* in the £
$1\frac{1}{2}$*d.* is $\frac{1}{10}$ of 1*s.* 3*d.*	125	6	8	= ..... 1*s.* 3*d.* in the £
	12	10	8	= ..... $1\frac{1}{2}$*d.* in the £
	£388	10	8	= tax at 3*s.* $10\frac{1}{2}$*d.* in the £

(872) $62\frac{19}{24} - \frac{1}{8} = 62\frac{16}{24} = 62\frac{2}{3}$;

∴ money received = $\pounds\frac{15240 \times 62\frac{2}{3}}{100}$ = £9550. 8*s*.

(873) Number of shillings in the £ = $\frac{4687500 \times 20}{7500000} = 12\frac{1}{2}$;

the debt = $\frac{20}{12\frac{1}{2}}$ of £1466. 12*s*. $9\frac{3}{4}$*d*. = £2346. 12*s*. 6*d*.

(874) 27 yd. 2 ft. 9 in. = 1005 in.; 17 yd. 1 ft. 11 in.
= 635 in.;

∴ value of 1st material = $\frac{7}{8}$ of $\frac{1005}{635}$ of 1270*d*.
= £7. 6*s*. $6\frac{3}{4}$*d*.

(875) Value of contents = $\frac{9}{11}$ of £3. 6*s*. $5\frac{1}{2}$*d*. = £2. 14*s*. $4\frac{1}{2}$*d*.

(876) Cost of 1 fork = $\frac{1}{12}$ of $\frac{100}{108\frac{1}{3}}$ of £14. 4*s*. $3\frac{1}{2}$*d*.
= £1. 1*s*. $10\frac{11}{26}$*d*.;

cost per oz. = 5*s*. 2*d*. + 1*s*. 6*d*. + 1*s*. = 7*s*. 8*d*.;

∴ number of oz. = $\frac{262\frac{11}{26}}{92} = \frac{6823}{2392} = 2\frac{2039}{2392}$.

(877) P. W. = $\frac{100}{135}$ of £506. 15*s*. $1\frac{1}{2}$*d*. = £375. 7*s*. 6*d*.;

amount of interest = £703. 16*s*. $6\frac{3}{4}$*d*. − £375. 7*s*. 6*d*
= £328. 9*s*. $0\frac{3}{4}$*d*.;

interest for 1 year = £13. 2*s*. $9\frac{3}{20}$*d*.;

∴ number of years = the number of times that £13. 2*s*. $9\frac{3}{20}$*d*. is contained in £328. 9*s*. $0\frac{3}{4}$*d*., which is 25.

(878) Interest on £150. 10*s*. for 4 months = £2. 10*s*. 2*d*.;

£253. 7*s*. 8*d*. remain to be paid, and the debtor ought to keep this sum beyond the original time of payment till the interest amounts to £2. 10*s*. 2*d*.;

interest for 1 month = $\pounds\frac{15203}{14400}$;

and £2. 10*s*. 2*d*. = $\pounds\frac{301}{120}$;

∴ number of months = $\frac{301 \times 14400}{120 \times 15203} = 2\frac{5714}{15203}$.

(879) Cost price $= \frac{100}{107\frac{1}{2}}$ of $54d. = \frac{40\times54}{43}d.$;

$\therefore$ 180 times the new price in pence + $(45 \times 54)d.$
$= \frac{11}{10} \times 225 \times \frac{40\times54}{43}d.$;

$\therefore$ 180 times new price $= (\frac{534600}{43} - 2430)d. = \frac{430110}{43}d.$;

$\therefore$ new price $= \frac{430110}{180\times43}d. = \frac{4779}{86}d. = 4s.\ 7\frac{49}{86}d.$

(880) *A*'s coals are valued at 27 × £1. 5*s*., or, £33. 15*s*.;
B's hops are valued at 6 × $\frac{10}{9}$ × £2. 14*s*., or, £18;
$\therefore$ *A* gets in cash £15. 15*s*.

(881) (*a*) $3 - \frac{1}{2 - \frac{5}{31}}$ divided by $1 + \frac{1}{4 + \frac{1}{3 - \frac{2}{7}}}$.

$= 3 - \frac{31}{57}$ divided by $1 + \frac{1}{4 + \frac{7}{19}}$

$= \frac{140}{57} \div (1 + \frac{19}{83}) = \frac{140}{57} \div \frac{102}{83} = \frac{5810}{2907} = 1\frac{2903}{2907}$.

(*β*) $\frac{7\frac{5}{6} - \frac{13}{6}}{6\frac{1}{2} - 3\frac{1}{2}} = \frac{5\frac{2}{3}}{3} = \frac{17}{9} = 1\frac{8}{9}$.

(882)

$$\begin{array}{r|l}
 & 1706\cdot5161\ (41\cdot31 \\
 & 16 \\
\hline
81 & 106 \\
 & 81 \\
\hline
823 & 2551 \\
 & 2469 \\
\hline
8261 & 8261 \\
 & 8261 \\
\hline
\end{array}$$

$\frac{86\cdot9211}{54\cdot75} = \frac{28\cdot9737}{18\cdot25}$, and 73 will then divide numerator and denominator, giving $\frac{\cdot3969}{\cdot25}$, of which the square root is $\frac{\cdot63}{\cdot5}$, or, $\frac{6\cdot3}{5}$, or, 1·26.

(883) Interest for the first year = £162·265
interest for the second year = £170·37825
interest for the third year = £178·8971625

$\therefore$ whole interest = £511·5404125

(884) Cost price = 300*s.*; selling price = $\frac{2100}{12} \times \frac{5}{2}$*s.*
= $437\frac{1}{2}$*s.*;
∴ his gain = $137\frac{1}{2}$*s.*, or, £6. 17*s.* 6*d.*;
gain per cent. = $137\frac{1}{2} \div 3 = 45\frac{5}{6}$.

(885) *A* runs 880 yards while *B* runs 800 yards;
then *B* runs 960 yards while *A* runs $\frac{9}{10}$ of 960 yards, or, 864 yards;
∴ *B* runs 1760 yards while *A* runs 1744 yards;
∴ *B* wins by 16 yards.

(886) For an income of £6 in the Indian stock I must pay $\frac{6}{10}$ of £215, or, £129;
∴ the Colonial stock is the better to invest in;
income from Indian stock = £$\frac{4515 \times 10}{2 \times 215}$ = £105;
income from Colonial stock = £$\frac{4515 \times 6}{2 \times 105}$ = £129;
∴ total income = £234.

(887) The ordinary train goes in 117 minutes as far as the express in 63 minutes;
∴ their rates are as 63 : 117, or, 7 : 13;
hence we have to divide the time between 9 A.M. and 2 P.M., that is 5 hours, into two parts in the ratio of 7 : 13;
∴ express takes $\frac{7}{20}$ of 5 hours, or, 1 hr. 45 min.

(888) L. C. M. of 21 and 19 is 21 × 19, or, 399;
suppose she buys 399 eggs for 19*s.*,
and 399 eggs for 21*s.*;
then 798 eggs cost her 40*s.*;
she sells them for $\frac{798}{20}$*s.*, or, 39·9*s.*;
∴ on 40*s.* she loses $\frac{1}{10}$*s.*;
∴ loss per cent. = $\frac{10}{4} \times \frac{1}{10} = \frac{1}{4}$.

(889) After the first sale he has left $\frac{1}{2}$ his stock $-$ 1;
after the second sale he has left $\frac{1}{4}$ his stock $- \frac{1}{2} - 1$;
after the third sale he has left $\frac{1}{8}$ his stock $- \frac{1}{4} - \frac{1}{2} - 1$;
after the fourth sale he has left $\frac{1}{16}$ his stock $- \frac{1}{8} - \frac{1}{4} - \frac{1}{2} - 1$;
and then he has none left;
∴ $\frac{1}{16}$ his stock $= 1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} = \frac{15}{8}$;
∴ his stock = 16 times $\frac{15}{8}$, or, 30.

(890) Length of carpeted space = $18\frac{5}{6}$ ft., and its breadth = 14 ft.;
∴ area of carpet = $(18\frac{5}{6} \times 14)$ sq. ft. $= \frac{113 \times 7}{3}$ sq. ft.;
∴ length of carpet required $= \frac{791}{3 \times 2}$ ft. $= 131\frac{5}{6}$ ft.

(891) P. W. $= \frac{100}{120}$ of £1344. 8*s*. $= \frac{5}{6}$ of £1344. 8*s*.;
∴ discount $= \frac{1}{6}$ of £1344. 8*s*. = £224. 1*s*. 4*d*.

(892) $\frac{7235621 - 7235}{99900} = \frac{7228386}{99900} = \frac{803154}{11100} = \frac{133859}{1850}$.

(893) Area of side $= \frac{5290}{10}$ sq. inches = 529 sq. in.;
∴ length of side $= \sqrt{529}$ in. = 23 in.

(894) Water passing in a minute
$= \frac{1 \cdot 109 \times 1760 \times 3 \times 60 \times 6 \times 1728 \times 4}{1109 \times 60}$ gall.
$= \frac{1760 \times 3 \times 6 \times 1728 \times 4}{1000}$ gall. $= 218972 \cdot 16$ gall.

(895) Money from sale of 4 per cents. $= £\frac{1170 \times 90}{100} = £1053$;
income from 6 per cents. $= £\frac{1053 \times 6}{108\frac{1}{3}} = £58 \cdot 32$;
income from 4 per cents. $= £\frac{1170 \times 4}{100} = £46 \cdot 8$;
∴ increase of income $= £11 \cdot 52$ = £11. 10*s*. $4\frac{4}{5}$*d*.

(896) (240 + 36 + 4)*d*. × number of sovereigns = value of the coins in pence;
∴ 280*d*. × number of sovereigns = (280 × 240)*d*.;
∴ number of sovereigns = 240;
∴ number of shillings = 720;
and number of pence = 960.

(897) The man starting from *A* finishes his walk in $\frac{3}{4} + \frac{48}{21}$, or, $3\frac{1}{28}$ hours;

in $3\frac{1}{28}$ hours the man starting from *B* goes $3\frac{1}{28} \times 3\frac{1}{2}$ miles, or, $10\frac{5}{8}$ miles; and he has therefore $4\frac{3}{8}$ miles still to walk.

(898) 24 men and 15 boys reap 174 acres in 6 days;
24 men and 28 boys reap 200 acres in 6 days;
∴ 13 boys reap 26 acres in 6 days;
∴ 1 boy reaps $\frac{1}{3}$ acre in 1 day;
then 8 men reap 24 acres in 3 days;
∴ 1 man reaps 1 acre in 1 day;
∴ 3 men and 6 boys will reap 15 acres in 3 days.

(899) Cost price of the tea sold per lb. = $\frac{100}{120}$ of 6*s.* = 5*s.*;
∴ he gains 1*s.* on each lb. of the 4*s.* tea and loses 6*d.* on each lb. of the 5*s.* 6*d.* tea, and he must therefore mix them in the ratio 1 : 2.

(900) For an income of £6 in New Zealand stock I pay £$\frac{6\times98}{5}$, or, £$119\frac{3}{5}$;
∴ the Victoria stock is the better investment.

(901) $\dfrac{\frac{5}{6} + \frac{11}{45} - \frac{11}{18}}{\frac{43}{7} \times \frac{7}{2} - \frac{7\times7\times9}{3\times2\times7} + \frac{8}{5}} = \dfrac{\frac{7}{15}}{\frac{63}{5}} = \frac{1}{27}$;
$\frac{40}{55} \times \frac{11}{7} \times \frac{21}{4} + \frac{1}{3} + \frac{17}{27} = 6 + \frac{1}{3} + \frac{17}{27} = 6\frac{26}{27}$;
$6\frac{26}{27} + \frac{1}{27} = 7$.

(902) Amount of assessment = $\frac{240}{33}$ of £81. 19*s.* = £596.

(903) For an income of £3 in the $3\frac{1}{2}$ per cents. I must pay $\dfrac{3\times96\frac{3}{4}}{3\frac{1}{2}}$, or, £$82\frac{13}{14}$;
∴ the former stock is the better investment;
income from $3\frac{1}{2}$ per cents. = £$\dfrac{5000\times3\frac{1}{2}}{96\frac{3}{4}}$ = £$\frac{70000}{387}$;
income from 3 per cents. = £$\dfrac{5000\times3}{93\frac{1}{8}}$ = £$\frac{24000}{149}$;
difference = £$\frac{10430000-9288000}{57663}$ = £$19\frac{46403}{57663}$.

(904) From 9 A.M. on Monday to 2 P.M. on Friday there are $4\frac{5}{24}$ days;

∴ difference between the watches $= (3\frac{1}{2} \times 4\frac{5}{24})$ min.
$= 14$ min. $43\frac{3}{4}$ sec.

(905) 6 men reap 35 acres in 7×12 hours;
1 man reaps 1 acre in $\frac{7 \times 12 \times 6}{35}$ hours;
9 men reap 45 acres in $\frac{45 \times 7 \times 12 \times 6}{9 \times 35}$ hours, or, 72 hours;
∴ they will take 9 days.

(906) When wheat is 15*s.* a bushel 8 men can be fed 12 days;
when wheat is 1*s.* a bushel 1 man can be fed $(12 \times 15 \times 8)$ days;
when wheat is 12*s.* a bushel 6 men can be fed $\frac{12 \times 15 \times 8}{12 \times 6}$, or, 20 days.

(907) Number of revolutions are respectively $\frac{7000}{6}$; $\frac{7014}{6}$; $\frac{7000}{7}$; $\frac{7014}{7}$, that is, $1166\frac{2}{3}$; 1169; 1000; 1002.

(908) 2 oxen eat as much as $\frac{14}{5}$ horses;

∴ number of days $= \dfrac{7 \times 87}{\frac{14}{5} + 3}$ days, or, $\frac{7 \times 87 \times 5}{29}$ days,
or, 105 days.

(909) The tree grows 36 in., 35 in., 34 in., ... 3 in., 2 in., 1 in. in each of the 36 years of its growth, or, which is the same thing, taking terms equidistant from the beginning and end, (37×18) inches, or, $\frac{37}{2}$ yd.;

∴ value of tree $= (\frac{37}{2} \times \frac{37}{2} \times \frac{37}{2})$*d.* $= \frac{50653}{8}$*d.*
$=$ £26. 7*s.* $7\frac{5}{8}$*d.*

(910) Money from sale of 3 per cents. $=$ £$(32 \times 86\frac{1}{4})$
$=$ £2760;
income from the 4 per cents. $=$ £$\frac{2760 \times 4}{115}$ $=$ £96;
original income $=$ £(32×3) $=$ £96;
∴ there is no alteration.

(911) ($\frac{6}{1000}$ of 500*d.* + $\frac{3420}{990}$ of 66*s.*) × $\frac{60}{11}$
= (£11. 8*s.* 3*d.*) × $\frac{60}{11}$ = £62. 5*s.*

(912) *B*'s work in 24 hours = *A*'s work in 20 hours;
∴ *A* could do $\frac{1}{2}$ the work in (12 + 20) hours, or, 32 hours;
∴ *C* does $\frac{1}{2}$ the work in $\frac{9}{5}$ of 32 hours, or, $57\frac{3}{5}$ hours.

(913) The 13 loaves equally divided give $4\frac{1}{3}$ loaves to each;
∴ the man who has 8 loaves gives $3\frac{2}{3}$;
and the man who has 5 loaves gives $\frac{2}{3}$;
∴ they must be paid in the proportion of 11 : 2.

(914) We have to divide a score of 206 between 79 hits;
∴ 3 × number of centres + 2 × (79 − number of centres)
= 206;
∴ number of centres = 206 − 158 = 48;
and ∴ number of outers = 79 − 48 = 31.

(915) 2 (4 × $2\frac{1}{2}$ + 4 × 3 + 3 × $2\frac{1}{2}$) sq. ft. = 59 sq. ft.;
∴ cost = $\frac{59 \times 15}{9}$*d.* = 8*s.* $2\frac{1}{3}$*d.*

(916) 1*d.* = $\frac{1}{12}$*s.* = $\cdot 08\dot{3}$*s.*;
∴ ·083333 is the decimal required.

(917) $\frac{2}{3}$ of Robert's debt to Charles + 10*d.* = Robert's debt to Charles;
∴ $\frac{1}{3}$ of Robert's debt to Charles = 10*d.*;
∴ Robert's debt to Charles = 2*s.* 6*d.*

(918) The time by *the clock* (though not by *the sun-dial*) is just midway between the times of rising and setting;

$$\therefore \text{time} = 4\text{ h. }15\text{ m.} + \frac{7\text{ h. }45\text{ m.} + 7\text{ h. }54\text{ m.}}{2}$$

= 4 h. 15 m. + 7 h. 49 m. 30 s. = 12 h. 4 m. 30 s.;
that is 4 min. 30 sec. P.M.

(919) Instead of £3 he gets £3 − 1*s.* 6*d.*, or, £$2\frac{37}{40}$;

∴ price paid for each £100 stock = £$\frac{2\frac{37}{40}\times 100}{3\frac{1}{4}}$

= £$\frac{117\times 100\times 4}{13\times 40}$ = £90;

∴ price of stock = $89\frac{7}{8}$;

again, since £3 − 3*s.* 9*d.* = £$2\frac{195}{240}$;

percentage = $\frac{2\frac{195}{240}\times 100}{90} = \frac{675\times 100}{240\times 90} = 3\frac{1}{8}$.

(920) The first man walks $\frac{4\times 1760\times 10}{60\times 60}$ yd., or, $19\frac{5}{9}$ yd. in 10 seconds;

∴ the train goes $(88 + 19\frac{5}{9})$ yd., or, $107\frac{5}{9}$ yd. in 10 seconds;

∴ $(\frac{9}{10}$ of $107\frac{5}{9})$ yd., or, $96\frac{4}{5}$ yd. in 9 seconds;

the second man walks $96\frac{4}{5}$ yd. − 88 yd., or, $8\frac{4}{5}$ yd. in 9 seconds;

∴ rate in miles per hour $= \frac{8\frac{4}{5}\times 60\times 60}{9\times 1760} = 2$.

(921) $\frac{21396\cdot 2}{527} = 40\cdot 6$; $\frac{2139\cdot 62}{527} = 4\cdot 06$;

$\frac{213962000000}{527} = 406000000$.

(922) $\frac{6885}{9900}\times\frac{5250}{9900} = \frac{153}{220}\times\frac{35}{66} = \frac{51\times 7}{44\times 22} = 36\cdot 880165\ldots\ldots$

(923) $4\frac{5}{6}\times 4\frac{3}{4} = \frac{29\times 19}{6\times 4} = \frac{551}{24}$;

∴ P. W. = $\frac{100}{100\frac{551}{24}}$ of £$3073\frac{230}{240}$;

= £$\frac{2400\times 737750}{2951\times 240}$ = £2500;

∴ discount = £3073. 19*s.* 2*d.* − £2500 = £573. 19*s.* 2*d.*

(924) 8*d.* in the £ is paid by £500 assets;

∴ debts = $\frac{240}{8}$ of £500 = £15000;

and assets = $\frac{1}{3}$ of the debts = £5000.

(925) 1 th. = 18 kr. + 22 kr. + $\frac{1}{3}$ th. + 30 kr.;

∴ $\frac{2}{3}$ th. = 70 kr.;

∴ 1 th. = 105 kr.;

∴ 4 th. = 420 kr. = 7 gulden.

(926) He walks back in ($3\frac{3}{4} - \frac{1}{2}$ of $2\frac{1}{2}$) hrs., or, $2\frac{1}{2}$ hours;

∴ he could walk both ways in 5 hours.

(927) $\frac{1}{2}$ of the constituency vote for *A*;

$\frac{1}{4}$ of the constituency vote for *B*;

$\frac{2}{3}$ of $\frac{1}{4}$ of the constituency vote for *D* and *E*;

now $\frac{1}{2} + \frac{1}{4} + \frac{1}{6} = \frac{6+3+2}{12} = \frac{11}{12}$;

∴ $\frac{1}{12}$ of the constituency = 540, and ∴ number of electors = 6480.

A's votes are $\frac{6480}{2}$, or, 3240;

B's votes are $\frac{4}{10}$ of 3240 + $\frac{1}{2}$ of 3240, or, 2916;

C's votes are $\frac{3}{10}$ of 3240 + $\frac{3}{10}$ of 3240, or, 1944;

D's votes are $\frac{2}{10}$ of 3240 + $\frac{1}{10}$ of 3240 + $\frac{2}{3}$ of 1620, or, 2052;

E's votes are $\frac{1}{10}$ of 3240 + $\frac{1}{10}$ of 3240 + $\frac{2}{3}$ of 1620, or, 1728.

(928) He walks 1 English mile in 15 min.;

∴ 1 German mile in $\frac{15}{\cdot 2136}$ min., or, $\frac{6250}{89}$ min.;

∴ he walks it in 1 hr. $10\frac{20}{89}$ min.

(929) $\frac{101}{100}$ of cost of the watch = $\frac{95}{100}$ of cost of the watch + £3;

∴ $\frac{6}{100}$ of cost of the watch = £3;

∴ cost of the watch = £50;

hence the French maker received $\frac{100}{125}$ of £50, or, £40.

(930) $\frac{\text{Distance in miles}}{4}$ = the certain time in hours + $\frac{1}{12}$;

$\frac{\text{distance in miles}}{5}$ = the certain time in hours − $\frac{1}{6}$;

∴ $\frac{\text{distance in miles}}{4} - \frac{1}{12} = \frac{\text{distance in miles}}{5} + \frac{1}{6}$;

∴ $\frac{\text{distance in miles}}{4} - \frac{\text{distance in miles}}{5} = \frac{1}{12} + \frac{1}{6}$;

∴ $\frac{\text{distance in miles}}{20} = \frac{1}{4}$;

∴ distance = 5 miles.

(931) 1864, 1868, 1872 were leap years;

$$\begin{array}{lr} \text{number of days in 11 years} = & 4015 \\ \text{add 3 for the leap years} = & 3 \\ \hline & 4018 \\ \text{deduct from Nov. 16 to March 3} - & 106 \\ \hline 7 & \underline{)\,3912} \\ & 558\frac{6}{7} \end{array}$$

and since he begins taking the paper on a Monday, the fraction may be taken as a whole week;

∴ he pays 559 sixpences, or, £13. 19*s.* 6*d.*

(932) *A*, *B*, *A* and *C* contribute £1390 + £1500;
B and *C* contribute £1590;
∴ twice *A*'s contribution is £1300;
hence *A* contributes £650, *B* £740, *C* £850, *D* £960;
∴ *A*'s share of gain = $\frac{65}{320}$ of £1152 = £234;
B's share of gain = $\frac{74}{320}$ of £1152 = £266. 8*s.*;
C's share of gain = $\frac{85}{320}$ of £1152 = £306;
D's share of gain = $\frac{96}{320}$ of £1152 = £345. 12*s.*

(933) Money from sale = £92 × $11\frac{1}{2}$ = £1058;
original income = £11·5 × 4 = £46;
∴ income from 4 per cents. = £56;
∴ price = $£\frac{1058 \times 3\frac{1}{2}}{56} = £\frac{529}{8} = £66\frac{1}{8}$.

(934) From *A* to *B* takes $\frac{1}{2}$ of 7 hr., or, $3\frac{1}{2}$ hr.;
∴ from *B* to *A* takes $5\frac{1}{4}$ hr. − $3\frac{1}{2}$ hr., or, $1\frac{3}{4}$ hr.;
∴ from *C* to *A* takes 2 × $1\frac{3}{4}$ hr., or, $3\frac{1}{2}$ hr.

(935) 40 (number of pence + 5) = number of nuts;
50 (number of pence − 10) = number of nuts;
∴ 40 times number of pence + 200 = 50 times number of pence − 500;
∴ 10 times number of pence = 700;
∴ number of pence = 70.

(936) In 13 days 54 men dig (81 × 13) ft., or, 1053 ft.;
in 11 days (1889 − 1053) ft., or, 836 ft. are dug;
∴ in 1 day 46 men and 8 boys dig 76 ft.;
now 1 man can dig $\frac{81}{54}$ ft., or, $\frac{3}{2}$ ft. in a day;
∴ 46 men can dig 69 ft. in a day;
∴ the 8 boys dig (76 − 69) ft., or, 7 ft.

(937) Superficial area of wall = $(324 \times \frac{11}{3})$ sq. ft.,
or, (108 × 11) sq. ft.;
∴ cost $= £\frac{108 \times 11 \times 14\frac{2}{3}}{272\frac{1}{4}} = £\frac{36 \times 11 \times 44 \times 4}{1089} = £64.$

(938) $\frac{24}{240}$ of *A*'s income = $\frac{16}{240}$ of *B*'s income + £$9\frac{1}{6}$;
and since their incomes are equal,
$\frac{8}{240}$ of *A*'s income = £$9\frac{1}{6}$;
∴ *A*'s income = £275.

(939) Average depth $= \frac{4 \text{ ft. } 6 \text{ in.} + 5 \text{ ft. } 3 \text{ in.}}{2} = 4 \text{ ft. } 10\frac{1}{2} \text{ in.};$
∴ content = $(270 \times 2\frac{1}{12} \times \frac{117}{72})$ cub. yd.
= $\frac{45 \times 25 \times 13}{4 \times 4}$ cub. yd.;
.. cost $= \frac{45 \times 25 \times 13 \times 15}{16}d. = \frac{219375}{16}d. = £57.\ 2s.\ 6\frac{15}{16}d.$

(940) *A* runs $(6 \times \frac{1}{3} + \frac{1}{6})$ miles, or, $\frac{13}{6}$ miles while
B runs $(5 \times \frac{1}{3} + \frac{1}{6})$ miles, or, $\frac{11}{6}$ miles;
∴ when *A* has finished the 3 mile course, *B* has run $\frac{11}{13}$
of 3 miles;
∴ *B* loses by $\frac{2}{13}$ of 3 miles, or, $\frac{6}{13}$ of a mile.

(941) $\frac{2253213}{267} = 8439$; $\frac{2253213000}{267} = 8439000$;
$\frac{2253 \cdot 213}{267} = 8 \cdot 439.$

(942) $\frac{64775}{990} + \frac{25}{900} = \frac{64775 \times 900}{990 \times 25} = \frac{25910}{11}$;
$\frac{64775}{990} \times \frac{25}{900} = \frac{1619 \cdot 375}{891} = 1 \cdot 817 \ldots.$

(943) $\frac{725}{9900}$ of 1287 po. $= \frac{29\times13}{4}$ po. $= \frac{377}{4}$ po. $= 94\cdot25$ po.;
$\cdot012625 \times 160$ po. $= 2\cdot02$ po.;
and $(94\cdot25 + 2\cdot02 - \cdot02)$ po. $= 96\cdot25$ po.
$= 2$ ro. $16\cdot25$ po.

(944) The sum of their ages 10 years ago was 60 years;
60 divided in the proportion of 7 to 5 gives 35 and 25;
∴ their present ages are 45 and 35.

(945) 210 and 665 are both divisible by 35;
∴ 201 men and 335 boys do as much in 6 days as
70 men and 96 boys do in 19 days;
∴ 6 × 201 men and 6 × 335 boys do as much as
19 × 70 men and 19 × 96 boys;
∴ 1206 men and 2010 boys do as much as 1330 men and 1824 boys;
∴ 186 boys do as much as 124 men;
∴ 3 boys do as much as 2 men;
∴ a man's work : a boy's work = 3 : 2.

(946) $\frac{1}{8} + \frac{1}{10} = \frac{9}{40}$; and ∴ $\frac{31}{40}$ of his income = £473. 13*s*. 1*d*.
∴ his income = $\frac{40}{31}$ of £473. 13*s*. 1*d*. = £611. 3*s*. 4*d*.

(947) *A*'s income-tax = $\frac{4}{5}$ of £9. 1*s*. 3*d*. = £7. 5*s*.;
∴ *A*'s income = $\frac{240}{5}$ of £7. 5*s*. = £348.

(948) Length of course $= (1760 + 995)$ yd. $= 2755$ yd.;
sound travels along this distance in $\frac{2755\times3}{1140}$ sec.;
the quicker boat goes $\frac{6}{29}$ mile an hour, or, $\frac{6\times1760\times3}{29\times60\times60}$ feet a second faster than the slower boat, and it will therefore be ahead of the slower boat $\frac{2755\times3}{1140} \times \frac{6\times1760\times3}{29\times60\times60}$ ft., or, $2\frac{1}{5}$ ft.

(949) At 2.45 P.M. the up train is 25 miles on the road;
we have therefore to divide 55 miles in the proportion of 41 : 25;
∴ when the trains meet down train has travelled $\frac{41}{66}$ of 55 miles, or, $\frac{41 \times 5}{6}$ miles;
∴ down train has travelled $\frac{5}{6}$ of an hour;
∴ the time is (2.45 + 0.50) P.M., or, 3.35 P.M.

(950) In $24\frac{3}{4}$ hours the clock lost 12 minutes;
from 11.30 P.M. on Nov. 29 to 1.45 P.M. on Dec. 7 there are $182\frac{1}{4}$ hours;
∴ time lost $= \frac{182\frac{1}{4} \times 12}{24\frac{3}{4}}$ min. $= \frac{729}{99}$ min. = 1 hr. $28\frac{4}{11}$ min.

(951)

	£	s.	d.	
4s. is $\frac{1}{5}$ of £1	1726	4	0	= dividend at £1 in the £
4d. is $\frac{1}{12}$ of 4s.	345	4	$9\frac{3}{5}$	= .... 4s. ....
1d. is $\frac{1}{4}$ of 4d.	28	15	$4\frac{4}{5}$	= .... 4d. ....
$\frac{1}{2}$d. is $\frac{1}{2}$ of 1d.	7	3	$10\frac{1}{5}$	= .... 1d. ....
$\frac{1}{4}$d. is $\frac{1}{2}$ of $\frac{1}{2}$d.	3	11	$11\frac{1}{10}$	= .... $\frac{1}{2}$d. ....
	1	15	$11\frac{11}{20}$	= .... $\frac{1}{4}$d. ....
	£386	11	$11\frac{1}{4}$	= dividend at 4s. $5\frac{3}{4}$d. in the £

(952) $\frac{\frac{34}{9} \times \frac{18}{17} + 4\frac{1}{12} - 3\frac{9}{16}}{5\frac{1}{9} - \frac{63 \times 20}{8 \times 567} + \frac{1}{3}} = \frac{4 + 4\frac{1}{12} - 3\frac{9}{16}}{5\frac{4}{9} - \frac{5}{18}} = \frac{4\frac{25}{48}}{5\frac{1}{6}} = \frac{7}{8}$;
$\frac{11 \times 7}{3 \times 29} \times \frac{29 \times 39}{8 \times 7} - 17\frac{3}{4} = \frac{143}{8} - \frac{71}{4} = \frac{1}{8}$;
$\frac{7}{8} + \frac{1}{8} = 1$.

(953) Area of pond = 82354 sq. ft.;
area occupied by water = (82354 − 288) sq. ft.
= 82066 sq. ft.;
∴ number of gall. $= \frac{82066 \times 144 \times 18}{277\frac{1}{4}} = 767232$.

(954) When 4d. is paid out of £1, 236 pence remain;
∴ income-tax $= \frac{4}{236}$ of £476. 18s. 4d. = £8. 1s. 8d.

(955) *A*'s wages for $22\frac{1}{2}$ days with *B*'s wages for $22\frac{1}{2}$ days are equal to *A*'s wages for $22\frac{1}{2}$ days with *A*'s wages for $16\frac{1}{14}$ days;

$\therefore$ *A*'s wages for $16\frac{1}{14}$ days = *B*'s wages for $22\frac{1}{2}$ days;

$\therefore$ *A*'s wages for $38\frac{4}{7}$ days = *B*'s wages for $\frac{22\frac{1}{2} \times 38\frac{4}{7}}{16\frac{1}{14}}$ days, or, 54 days.

(956) *B* runs 280 yd. while *C* runs 266 yd.;

$\therefore$ *B* runs 100 yd. while *C* runs $\frac{266 \times 100}{280}$ yd., or, 95 yd.;

$\therefore$ *B* can beat *C* by 5 yd.

(957) Put *C* for the length of the course in yards;

in 4 minutes the losing boat goes ($C - 1140$) yd.;

in $6\frac{3}{4}$ minutes the losing boat goes ($C - 40$) yd.;

$$\therefore \frac{C - 1140}{4} = \frac{C - 40}{6\frac{3}{4}}, \text{ or,}$$

$$\therefore \frac{C - 1140}{4} = \frac{4(C - 40)}{27},$$

or, $27C - 30780 = 16C - 640$;

$\therefore 11C = 30140$, $\therefore C = 2740$;

also, speed of winning boat in miles per hour

$$= \frac{2740 \times 60}{6\frac{3}{4} \times 1760} = 13\tfrac{83}{99}.$$

(958) The clock loses $9\frac{4}{9}$ min. in $106\frac{1}{4}$ hr.;

the clock loses $1\frac{4}{9}$ min. in $\frac{106\frac{1}{4} \times 1\frac{4}{9}}{9\frac{4}{9}}$ hr., or, $16\frac{1}{4}$ hr.;

$\therefore$ the time is 3 P.M. on Dec. 3.

(959) In 15 minutes *B* will fill half the cistern;

$\therefore$ *A* must run $\frac{25}{2}$ min., or, $12\frac{1}{2}$ min.

(960) 4 × (income − £450) = 6 (£500 − income);

$\therefore$ 4 × income − £1800 = £3000 − 6 × income;

$\therefore$ 10 × income = £4800, or, income = £480.

(961) $\frac{38825}{900} \times \frac{2325}{990} = \frac{38825}{900} \times \frac{775}{330} = \frac{30089 \cdot 375}{297}$
$= 101 \cdot 310 \ldots\ldots$

(962) $\frac{25715300}{151} = 170300$; $\frac{25715 \cdot 3}{151} = 170 \cdot 3$;
$\frac{257153}{151} = 1703$.

(963) Sum of all the rates = 16*s.* $0\frac{1}{2}$*d.* = $192\frac{1}{2}$*d.*
∴ rateable value of house = £$\frac{7700}{192\frac{1}{2}}$ = £40.

(964) Content of cistern = $\frac{5 \times 20 \times 112 \times 16}{1000}$ cub. ft.
= $\frac{56 \times 16}{5}$ cub. ft.;
∴ $5\frac{5}{7} \times$ square of length = $\frac{56 \times 16}{5}$ cub. ft.;
∴ square of length = $\frac{7 \times 56 \times 16}{35 \times 5}$ sq. ft.;
∴ length = $5\frac{3}{5}$ ft. = breadth.

(965) Since $3\frac{1}{3}$ times the original number of occupants have to live on provisions which would have lasted the original number 90 days, the store will last $(90 \div 3\frac{1}{3})$ days, or, 27 days.

(966) Price of stock = £$\frac{2700 \times 3\frac{1}{2}}{105}$ = £$\frac{1350}{15}$ = £90.

(967) *A*'s wages : *B*'s wages = $\frac{245}{3} : \frac{245}{4} = 4 : 3$;
∴ *A*'s wages + *B*'s wages = $\frac{7}{3}$ of *B*'s wages;
∴ time required = $\frac{3}{7}$ of $81\frac{2}{3}$ days = 35 days.

(968) *A* runs 200 yd. while *B* runs 190 yd.;
B runs 200 yd. while *C* runs 190 yd.;
∴ *B* runs 190 yd. while *C* runs $\frac{190 \times 190}{200}$ yd.;
∴ *A* runs 400 yd. while *C* runs $\frac{190 \times 190 \times 2}{200}$ yd., or, 361 yd.;
∴ *A* can beat *C* by 39 yd.

(969) In $8\frac{2}{5}$ min. *B* can fill $\frac{1}{30}$ of $8\frac{2}{5}$, or, $\frac{7}{25}$ of the cistern;
∴ *A* has to fill $\frac{18}{25}$ of the cistern;
∴ time required = $(\frac{18}{25} + \frac{1}{25})$ min. = 18 min.

(970) In the last 4 years he saves £200 + £120, or, £320;

∴ his income − $\frac{9}{10}$ (his income + £40) = £80;

∴ $\frac{1}{10}$ of his income − £36 = £80;

∴ his income = £1160.

(971) $\frac{3}{2}\times\frac{14}{5}+\frac{55\times4}{8\times11}+5\frac{1}{2}+\frac{\cdot77\dot{3}}{1\cdot\dot{5}}=\frac{21}{5}+\frac{5}{2}+\frac{11}{2}+\frac{696\times9}{900\times14}$

$=12+\frac{1}{5}+\frac{87}{175}=12\frac{122}{175}$.

(972) Number of half-crowns + $\frac{5}{2}$ × number of half-crowns
+ 5 × number of half-crowns = 102;

∴ $\frac{17}{2}$ × number of half-crowns = 102;

∴ number of half-crowns = 12;

∴ number of shillings = 30,
and number of sixpences = 60.

(973) $\frac{\text{160 mètres}}{\text{167 feet}}=\frac{22}{7}$;

∴ 1 mètre = $\frac{22\times167}{7\times160}$ ft. = $\frac{11\times167}{7\times80}$ ft. = 3·28035.....

(974) Half the soldiers with half the navvies do $\frac{1}{8}$ daily;
all the soldiers with half the navvies do $\frac{1}{7}$ daily;

∴ half the soldiers do $\frac{1}{56}$ daily;

∴ half the navvies do $(\frac{1}{8}-\frac{1}{56})$, or, $\frac{6}{56}$ daily;

∴ the navvies do 6 times as much as the soldiers.

(975) £7. 19*s.* 7½*d.* is the interest on £63. 17*s.*
(see Question 665);
£7. 19*s.* 7½*d.* = 1915½*d.*, and £63. 17*s.* = 3831*d.*;

∴ rate per cent. = $\frac{100\times1915\frac{1}{2}}{3831}=6\frac{1}{4}$;

again, £12½ is the discount on £113½ for 2 years;

∴ sum required = £$\frac{112\frac{1}{2}\times63\frac{17}{20}}{12\frac{1}{2}}$ = £574. 13*s.*

(976) Cost price = 5200*d.* + 600*d.* = 5800*d.*;
selling price = 6000*d.* + 700*d.* = 6700*d.*:

∴ gain = 900*d.*;

∴ gain per cent. = $\frac{900\times100}{5800}=\frac{450}{29}=15\frac{15}{29}$.

(977) Value to be put on a stone of flour $= \frac{14 \times 27}{13\frac{1}{2}}d. = 2s.\ 4d.$

(978) 5 men = 10 boys, and 10 men = 20 boys ;
then if 17 boys reap 125 acres in 15 days ;
1 boy reaps 1 acre in $\frac{15\times17}{125}$ days ;
23 boys reap 75 acres in $\frac{15\times17\times75}{23\times125}$ days, or, $6\frac{15}{23}$ days.

(979) 1 kilogramme = weight of $\frac{1}{1000}$ cub. mèt. of water

$= \text{weight of } \frac{(\frac{5}{8000})^3}{1000}$ cub. miles of water

$= \text{weight of } \frac{(\frac{5}{8000} \times 1760 \times \frac{3}{6})^3}{1000}$ cub. fathoms of water

$= \frac{(\frac{5\times11}{100})^3 \times 6 \times 20 \times 112}{1000}$ oz. avoirdupois

$= \frac{1331\times6\times20\times112}{20\times20\times20\times1000}$ oz. avoirdupois

$= \frac{27951}{12500}$ oz. avoirdupois ;

∴ the ratio is 27951 : 12500.

```
(980)        6                          267·000000000
                                        216
                                        -----
     18      4       10800               51000
                       736 )
                     -----  }
                     11536 }             46144
                        16 )             -----
                     -------
    192      3       1228800              4856000
                        5769 )
                     -------  }
                     1234569  }           3703707
                           9 )            -------
                     ---------
   1929      9       124034700            1152293000
                        173691
                     ---------
                     124208391            1117875519
                                          ----------
                                            34417481
```

∴ cube root is 6·439...

(981) $\frac{\frac{45}{8}\times\frac{3}{2}}{\frac{6\times5}{5\times9}\times\frac{3}{31}}\times\frac{2}{5}\times\frac{\frac{3\times37}{2\times9}}{\frac{111}{8}\times\frac{16}{3}}=\frac{45\times3\times31}{8\times2\times2}\times\frac{2\times37\times8}{5\times2\times111\times16}$
$= 4\frac{23}{64}$.

(982) Interest on £10666. 13*s.* 4*d.* = £$\frac{32000}{3\times20}$ = £533. 6*s.* 8*d.*;
interest on £10800 = £$\frac{10800}{20}$ = £540;
interest on £10935 = £$\frac{10935}{20}$ = £546. 15*s.*;
interest on £11071·6875 = £$\frac{11071\cdot6875}{20}$
= £553·584375
= £553. 11*s.* 8$\frac{1}{4}$*d.*

(983) The land in the northern hemisphere is $\frac{3}{4}$ of $\frac{1}{4}$ of the whole earth, or, $\frac{3}{16}$ of the whole earth, and therefore $\frac{3}{8}$ of the northern hemisphere;
and the land in the southern hemisphere is $\frac{1}{4}$ of $\frac{1}{4}$ of the whole earth, or $\frac{1}{16}$ of the whole earth, and therefore $\frac{1}{8}$ of the southern hemisphere.

(984) In 1 acre there are $\frac{4840}{40}$, or, 121 saplings;
the value of each is 1*s.* 3*d.* + 15 times 1*s.* 3*d.*, or, £1;
∴ the whole value is £121.

(985) 1 apple costs $\frac{2}{5}$*d.*;
1 plum costs $\frac{8}{25}$*d.*;
1 pear costs $\frac{14}{15}$*d.*;
1 apricot costs $\frac{7}{4}$*d.*;
now the L. C. M. of 5, 25, 15 and 4 is 300;
∴ I must buy 300 of each fruit, and they cost me
(120 + 96 + 280 + 525)*d.*, or, 1021*d.*,
or, £4. 5*s.* 1*d.*

(986) When the elder boy runs 100 yd. the younger runs $\frac{10\frac{1}{2}\times100}{13}$ yd., or, $\frac{1050}{13}$ yd., or, $80\frac{10}{13}$ yd., and therefore the younger must have a start of $19\frac{3}{13}$ yards.

(987) He has to pay for interest £$(10 \times 4\frac{1}{2} \times 2\frac{1}{2})$,
or, £112. 10*s.*;
he receives £$(1000 \times 12\frac{1}{2} \times 2\frac{1}{2})$, or, £312. 10*s.*;
∴ he gains £200.

(988) Area of sides $= \{(42 + 31) \times 10\}$ sq. ft.
$= 730$ sq. ft.;
area of windows $= (3 \times 8\frac{1}{3} \times 4\frac{1}{2})$ sq. ft. $= 112\frac{1}{2}$ sq. ft.;
area of doors $= (4 \times 6\frac{1}{2} \times 3\frac{1}{4})$ sq. ft. $= 84\frac{1}{2}$ sq. ft.;
area of fireplace $= (6 \times 4)$ sq. ft. $= 24$ sq. ft.;
area of skirting $= (54 \times 1\frac{2}{3})$ sq. ft. $= 90$ sq. ft.;
∴ area to be papered $= (730 - 311)$ sq. ft. $= 419$ sq. ft.;
∴ cost = 419*d.* = £1. 14*s.* 11*d.*

(989) £38. 8*s.* is the interest on £640 for a year and a half;
∴ interest on £100 for $1\frac{1}{2}$ years = £$\frac{38 \cdot 4 \times 100}{640}$ = £6;
∴ the rate per cent. is 4.

(990) *A* demands for his sheep £$(59 \times 2\frac{5}{8})$, or, £154. 17*s.* 6*d.*;
B has to get for his beer £154. 17*s.* 6*d.* − £98. 3*s.* 6*d.*,
or, £56. 14*s.*;
B has (36×18) gallons of beer, or, 648 gallons;
∴ price = $\frac{\text{£}56\ 14s.}{648}$ = 1*s.* 9*d.*;
∴ he must raise his price 3*d.* a gallon.

(991)

	£	s.	d.	
	1	6	8	= cost of 1 ton
			5	
10 cwt. is $\frac{1}{2}$ of 1 ton	6	13	4	= cost of 5 tons
2 cwt. is $\frac{1}{5}$ of 10 cwt.		13	4	= ...... 10 cwt.
2 qr. is $\frac{1}{4}$ of 2 cwt.		2	8	= ...... 2 cwt.
14 lb. is $\frac{1}{4}$ of 2 qr.			8	= ...... 2 qr.
			2	= ...... 14 lb.
	£7	10	2	= cost of 5 tons 12 cwt. 2 qr. 14 lb.

(992) Find the L. C. M. of the numbers, omitting 2, 3, 4, 5, 6.

$$\begin{array}{r|l} 2 & 8,\ 9,\ 10,\ 11,\ 12 \\ \hline 2 & 4,\ 9,\ 5,\ 11,\ 6 \\ \hline 3 & 2,\ 9,\ 5,\ 11,\ 3 \\ \hline & 2,\ 3,\ 5,\ 11,\ 1 \end{array}$$

∴ L. C. M. is 72 × 55, or, 3960.

(993) 1 pint contains $\frac{277\cdot27}{8}$ cub. inches, or, $\frac{277\cdot27}{8\times1728}$ cub. ft.;
∴ 1 pint weighs $\frac{277\cdot27\times62\cdot42}{8\times1728}$ lb., or, $\frac{277\cdot27\times31\cdot21}{4\times1728}$ lb.,
or, $\frac{8653\cdot5967}{6912}$ lb., or, 1·25.... lb.

(994) 15 men and 30 children get £(177 − 60), or, £117;
∴ 1 man and 2 children get £$\frac{117}{15}$;
and 1 man and 1 child get £6;
∴ 1 child gets £$\frac{117-90}{15}$, or, £1. 16*s.*;
hence 1 man gets £4. 4*s.*, and 1 woman gets £3.

(995) Cost of 72 dozen = (12 × 84 + 60 × 48)*s.* = 3888*s*;
selling price of 72 dozen = (72 × 72)*s.* = 5184*s.*;
∴ he gains 1296*s.*;
∴ gain per cent. = $\frac{1296\times100}{3888} = \frac{100}{3} = 33\frac{1}{3}$.

(996) At end of 1st season he has 160 + 80 + 120,
or, 360 sheep;
at end of 2nd season he has 360 + 80 + 120,
or, 560 sheep;
at end of 3rd season he has 560 + 80 + 120 + 40 + 60,
or, 860 sheep.

(997) He has to realise £(120 + 12·5 + 625 + 62·5),
or, £820;
∴ he must gain per head £$\frac{820-625}{50}$, or, £3. 18*s.*

(998) At first 460 rub. = 920 fr. = £40;
afterwards 460 rub. = 690 fr. = £28. 15*s.*;
∴ he gains £11. 5*s.*

(999) 4285 − (2540 + 980) = 765, the number of grains of soda and potash that take up 980 grains of the sulphuric acid;

$$\text{hence } \frac{49 \times \text{number of gr. of soda}}{32} + \frac{49 \times (765 - \text{number of gr. of soda})}{48} = 980;$$

or, 3 × number of gr. of soda + 2 × (765 − number of gr. of soda) = 20 × 96;
∴ number of gr. of soda = 1920 − 1530 = 390;
∴ number of gr. of potash = 765 − 390 = 375.

(1000) Cost of second house = $\frac{8}{3}$ of £500 = £$\frac{4000}{3}$;
∴ cost of first house = $\frac{3}{2} \times \frac{2}{1} \times \frac{4}{3} \times \frac{60}{40} \times$ £$\frac{4000}{3}$
= £8000.

THE END.

LONDON: PRINTED BY WILLIAM CLOWES AND SONS, LIMITED,
STAMFORD STREET AND CHARING CROSS.

3, WATERLOO PLACE, LONDON,
March, 1883.

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